THE IRON TRADE REVIEW

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FURTHER DECLINES

ARE NOTED IN PRICES OF PIG IRON.

Heavy Rail Orders Booked.—Price of Wire Products Advanced.—Record Sales of Structural Material.

In spite of still further declines in prices of pig iron and of some other evidences of recession in business, great activity continues at nearly all manufacturing plants, and there are no alarming signs.

Pig Iron Very Dull

Reports uniformly indicate extreme quiet in pig iron, and in southern grades particularly there is considerable weakness. No. 2 foundry for early delivery can be purchased at $18 Birmingham, and Ohio malleable is reported sold at $21 at the furnace. The low grades are especially dull. Resale iron is not now prominent in the market, as a considerable part of the iron now being delivered was contracted for at $18.50, and reselling is not profitable.

Heavy Ore Shipments

Ore shipments from the Lake Superior region show a large increase over last year, the three ports at the head of the lakes having made a gain of 885,529 tons last month as compared with August, 1906. There is still a considerable shortage of labor at the mines, and men are being imported to take the place of the strikers. Large numbers of miners have left this country for their former homes in foreign lands.

Rail Orders Placed

An encouraging feature of the week is the action of several railroads in placing orders for rails for 1908 delivery, the understanding being that the specifications to be agreed upon by the joint committee of representatives of the railroads and the steel manufacturers will govern. The B. & O., Norfolk & Western, and Hocking Valley railways placed orders aggregating 60,000 tons with the Carnegie Steel Co., and the Illinois Steel Co. booked about 10,000 tons. It is estimated that railroads will require about 1,000,000 tons more for next year than have been ordered.

Shafting Is Weak

Since the dissolution of the shafting association, prices have declined sharply. The demand for merchant pipe is active, and mills are having difficulty in making shipments fast enough to satisfy buyers. New business in tin plate is light, but shows some improvement.

Wire Prices Advanced

Owing to the long continued heavy demand for wire products, an advance of $1 per ton is announced. The prosperity of the farmers and the favorable prospects for crops have been an important factor in the prosperity of the wire industry. The demand for structural material is strong, although not quite so active as last month, when the American Bridge Co. booked the largest tonnage of any August in its history.

Machine Tools

Machine tool manufacturers report improvement in business, with an active demand for all that they can turn out. Orders from foreign countries are coming in at an encouraging rate. Practically no cancellations of orders, some of which were placed many months ago, are reported.

Coke and Old Material

The coke market is firm and the demand active. Old material is weak, but prices are not so low as might be expected, considering all the unfavorable conditions.

FINE SHOWING

MADE IN SHIPMENTS AT HEAD OF THE LAKES.

Large Increase Over August of Last Year.—Importation of Miners to Take Strikers' Places Continues.

Office of THE IRON TRADE REVIEW,
411 Providence Bldg.,
Duluth, Sept. 2.

The shipment of ore from the head of the lakes during August was most gratifying. From Duluth, Two Harbors and Superior a total of 4,706,212 tons was sent down the lake, which is 886,529 tons more than was handled in August, 1906, and if the three other ports move a million and three-quarters tons, a new record movement for any month will be made, surpassing the previous record made in June last. The month and week just closed were the largest in the history of the Allouez docks, exceeding the former maximum by almost 150,000 tons. A rush was made at all of the docks at the end of the month to get all the boats out of port over the double holiday, Sunday and Monday. At the Mesabi docks all the boats were gotten out by 7 A. M. Sunday morning that arrived before Saturday night, and no work was done for two days. At Two Harbors and Allouez a number of vessels were left and the former docks began work at midnight Sunday again, the other docks working all day Sunday. The shipments for the month are shown in the table on page 369.

The boats are getting away from the head of the lakes with very good speed again and all the delays occurring have to do with the unloading of coal cargoes. There is also an improvement in this trade, as the coal has begun to move away from the docks to the interior more rapidly.

The strike situation on the Mesabi range remains practically the same. There has been no disturbance at all during the week at any points on the range except Eveleth, where the strikers have been in evidence on the streets to some extent, and where several attempts have been made to

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THE WEEK IN IRON CENTERS

PITTSBURG.

Large Sales of Steel Rails—Wire Prices Advanced—Pig Iron Quiet.

Office of THE IRON TRADE REVIEW,
521 Park Bldg., Sept. 4.

The general tone of the market conditions during the past week has been slightly better than during the previous week. Pig iron is just as quiet as it has been and no sales of Bessemer except in very small lots are reported. Foundry iron is moving in tonnages ranging from carloads to 100-ton lots with prices unchanged. It is in finished lines that the improvement is noted.

Wire products advanced five cents, effective Sept. 3, but, aside from this one line, prices remain the same throughout, with the exception of scrap. The situation on semi-finished material is a little easier on billets and slabs and this material is easier to obtain. The Carnegie Steel Co., through which the semi-finished material for subsidiary companies of the Steel Corporation is bought, has announced that it will not be a buyer until after shipments have been completed on old contracts. Purchases of Bessemer and open-hearth billets during the past several months call for deliveries by Oct. 1, but deliveries have been slow and contracts may not be completed before Oct. 15. The sheet bar situation is very firm and a scarcity of this material is noted, largely on account of a breakdown at the plant of the Youngstown Sheet & Tube Co., and a shut-down for repairs at the New Castle plant of Carnegie Steel Co. New Castle resumed Tuesday morning of this week. On account of the badly congested condition of standard rail shipments, the Ohio Works of Carnegie Steel Co. at Youngstown may again be put on rails which will still further decrease the supply of sheet and tin bars. Producers of semi-finished material who have not already sold up to capacity through the last quarter of the year are holding back awaiting developments.

The rail market has shown a decided improvement and the leading interest during the week sold 60,000 tons of standard sections for 1908 delivery, 37,000 tons of this going to the Baltimore & Ohio, and the remainder to the Norfolk & Western and the Hocking Valley railroads. These contracts are not reservations of this capacity, but actual contracts, although no provision as to quality specifications were embodied in the contracts. The Pennsylvania, New York Central and Wabash contracts are expected within a short time, or as soon as the committee having the 1908 specification under advisement makes its report. Contracts already placed will be given rails according to the decision of the committee.

After making severe tests of the National Tube Co.'s Spellerized steel boiler tubes, the Pennsylvania lines and the Delaware & Hudson railroad each placed contracts for tubing to equip 30 locomotives with the special tubes.

Pig Iron.—The monthly average price of Bessemer pig iron was $22.90, delivered Pittsburg, during the month of August as compared with $24.13 in May, $24.15 in June and $23 31 in July, the valley prices being 90 cents lower than the price delivered in Pittsburg. The average price during the first half of last year was $17.25, valley and the highest price during last year was in December when it reached $22.07, valley. The leading producers report no sales of steel making iron during the week under review. The total sales reported during August reached 22,000 tons of Bessemer. The only foundry iron being sold is in lots ranging from carloads to 100 tons to cover immediate requirements and no interest is being shown in the direction of buying for the future. Basic pig iron is quoted $20.50 valley, No. 2 northern foundry $22, valley, although this could probably be shaded from 25 to 50 cents per ton on a firm inquiry for a large tonnage. Consumers are expecting lower prices and are waiting for them. Present prices are nominal, as not enough pig iron is being moved to establish a definite market. For delivery over the remainder of the year, we quote as follows:

Bessemer, Valley	$22.00 to 22.25
Bessemer, Pittsburg	22.90 to 23.15
No. 1 Foundry, Pittsburg	23 60 to 23.90
No. 2 Foundry, Pittsburg	22 90 to 23.15
Gray Forge, Pittsburg	21.90 to 22.15
Basic, Valley	20.50 to 21.00
Basic, Pittsburg	21.40 to 21.90

Ferro-Manganese.—This market is exceedingly quiet and prices have shown an inclination to recede, dealers being anxious to sell and are asking for bids rather than quoting prices. For prompt shipment, we quote $61 Pittsburg on foreign 80 per cent ferro and $60 Pittsburg for shipment during the remainder of the year.

Imported 50 cent ferro-silicon is quoted $106 Pittsburg, domestic 12 per cent, $36; 11 per cent, $35; 10 per cent, $34. The lower grades of imported ferro-silicon are quoted 50 cents lower. These quotations are applicable to Pittsburg territory. Western and central western prices, where the material is not subject to the competition of foreign grades, are higher, and in the east a little lower.

Plates.—Specifications are keeping up to mill shipments and the leading interest will not take on new business for shipment during the remainder of the year, and will undoubtedly carry over a large tonnage into next year. No new business is reported from lake ship yards. The Southern Pacific has an inquiry out for 600 steel cars. We quote:

Tank plate, ¼-inch thick, 6¼ to 100 inches, 1.80c to 1.90c f. o. b. mill Pittsburg for prompt shipment, and 1.70c base Pittsburg on future deliveries. Extras are as follows per 100 pounds: Boiler and flange steel plates 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than four inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c; plates in width over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1.00c. Gages under ¼-inch to and including 3-16-inch plate on thin edges, 0.10c; under 3-16 to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets.—An improvement is noted in the inquiry for roofing sheets, as well as in other lines, but conditions are still comparatively easy as far as actual new business placed. Demands for deliveries on blue annealed and galvanized sheets are still very heavy and delivery promises are about 20 weeks. The supply of semi-finished steel is inadequate and handicapping several operators. We quote:

Black steel sheets one pass, cold rolled, Nos. 11-12, 2.20c; Nos. 13-14, 2.25c; Nos. 15-16, 2.30c; Nos. 17-21, 2.35c; Nos. 22-24, 2.40c; Nos. 25-26, 2.45c; No. 27, 2.50c; No. 28, 2.60c; No. 29, 2.75c; No. 30, 2.85c; galvanized Nos. 10-11, 2.65c; Nos. 12-14, 2.75c; Nos. 15-16, 2.85c; Nos. 17-21, 3.00c; Nos. 22-24, 3.15c; Nos. 25-26, 3.35c; No. 27, 3.55c; No. 28, 3.75c; No. 29, 4.00c; No. 30, 4.25c; blue annealed, No. 10 and heavier, 1.85c; Nos. 11-12, 1.90c; Nos. 13-14, 1.95c; Nos. 15-16, 2.05c. Corrugated roofing, $1.90 per square for No. 28 painted, 2½-inch corrugation, and galvanized, $3.25 per square for No. 28.

Tin Plate.—The new business is light, although more of it is being placed now than for some time past, and the outlook is more encouraging for the last quarter than it has been since early summer. On account of the shortage of sheet and tin bars the talk of price cutting has not been heard for the past two weeks, and independents who are dependent upon the open market for their semi-finished material at present prices have no opportunity to shade. We quote as follows:

Coke tin plate, 100-pound basis, 14 x 20, $3.90 f. o. b. mill, Pittsburg district. Terms, 30 days, less 2 per cent for cash in 10 days.

Rails and Track Material.—After a quiet period extending over more than two months the standard rail movement has picked up, and during the week under review the leading local interest has placed in its books for 1908 delivery 60,000 tons of standard rails. Of this tonnage 37,000 tons was for the Baltimore & Ohio and the remainder divided between the Hocking Valley and the Norfolk & Western. Nothing was said in the contracts covering these purchases about the percentage of bloom crop. The Pennsylvania lines, New York Central lines and Wabash have not covered for next year, and the Baltimore & Ohio tonnage will be of such specification as will be determined later by the other large interests. Railroads are urging shipments on contracts already placed and mills are badly congested on standard rail deliveries. It may be necessary, in order to meet the situation to put the Youngstown plant of the Carnegie Steel Co. on rails instead of billets and sheet bars, upon which it is running at the present time.

Fifty-pound and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; 8-pound, $40; 12-pound, $36 to $37; 16-pound, $35 to $36; 20-pound, $34 to $35; 25 to 45-pound, $33 to $34; angle splice bars for standard sections, $1.65; standard spikes, $2.15 to $2.20, Pittsburg; hand spikes, $2.40 to $2.50 Pittsburg.

Steel.—The sheet bar situation has tightened up during the past week on account of the Youngstown Sheet & Tube Co.'s bar mill being out for repairs, and the New Castle plant of Carnegie Steel Co. being out for the same reason. New Castle resumed on Tuesday of this week. The Carnegie Steel Co., which buys semi-finished material for all subsidiary companies of the corporation, has decided it will do no more buying until shipments are completed on former purchases. This will mean at least six weeks longer. The only producer with a surplus capacity offering billets for September is the Alan Wood Co. Other interests are awaiting developments or selling for the last quarter, although it is generally understood that Republic and Youngstown Sheet & Tube Co. are sold up for the year. The billet and slab situation is slightly easier, and we quote $29.50 Pittsburg on 4 x 4 and larger, and sheet bars $31 Pittsburg firm.

Hoops, Bands and Cotton Ties.—Specifications against old contracts are on a par with mill shipments, but there is no new business being placed at this time. We qoute:

Hoops in carload lots, 2c; in less than carload lots, 2.10c; bands, 1.60c, base half extras as per standard steel, Cotton ties, 97c per bundle.

Merchant Bars.—The steel bar market is in excellent condition and the demand for shipments is tremendous from all branches of the trade. No new business is being placed at this time, as practically all requirements through the first half of next year have been contracted for and mills have an unprecedented tonnage on their books. A small tonnage of iron bars is being moved, but it is light and this branch of the business is quiet. Official quotations on cold rolled and ground shafting are being shaded to large buyers and 55 per cent off on large lots has been done. We quote:

Common iron bars, 1.70c to 1.75c Pittsburg in carload lots and over, 1.75c to 1.80c in less than carloads; 1.60c base Pittsburg, plus freight to point of shipment on western deliveries; Bessemer steel bars, 1.60c net for future deliveries; 1.85c to 1.95c out of stock; plow and cultivator, 1.60c net; channels, angles, zees, tees, under three inches, 1.70c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size, 0.30c advance. Cold rolled and ground shafting, 50 per cent off in carloads, and 45 per cent in less than carloads, delivered in base territory; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flats, 1.60c to 1.65c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.10c to 2.15c. The price of planished and machine straightened tire is 1.80c, base, half tire extras. Iron finished tire up to 1½ inch and over to be sold on regular bar basis of 1.60c base, half extras, steel card.

Structural Material.—The importunity of requests to crowd extra tonnages on present rollings is the feature of the market in structural shapes. This is especially true of the heavier shapes. New business is particularly good on shapes and this branch of the finished lines is taking the lead over all others, the improvement being noticed during the past two or three weeks. The range of rollings is being covered in from six to eight weeks. We quote:

Beams and channels, 15-inch, and under, 1.70c; over 15 inches, 1.90c; zees, 1.70c; tees, 1.70c; angles from three to six inches inclusive, 1.70c; over six inches, 1.80c; universal and sheared plates, 6¼ inches and wider, 1.80c base.

Wire and Wire Nails.—An advance of 5c on nails and wire is announced effective Sept. 3. This advance has been expected for two months past. The fall business is coming up in good volume without solicitation, and as has been noted in these reports, manufacturers start the season with barren ware-houses and no stocks. We quote as follows:

Wire nails, jobbers' carload lots, $2.05, retailers' carload lots, $2.10; less than carloads, $2.15; painted barb wire, $2.20 for jobbers in carloads; retailers in carloads, $2.25; and less than carload, $2.35, with 30c for galvanizing; plain wire, $1.90c for jobbers, and $1.95 by carload.

Merchant Pipe.—The volume of new business in merchant pipe, as well as specifications against contracts, has slowed up. Mills are three to five months behind on their shipments and are making no delivery promises. Jobbers' stocks are out of balance. This is largely due to slow deliveries made on contracts placed last spring, upon which material is now being received. Jobbers are pressing hard for shipment on some sizes, and asking for deferred shipment on others. The

market is very strong. The leading interest as well as some of the independent manufacturers will be compelled to carry a large tonnage over into next year. Customers' discounts in large lots are unchanged.

Boiler Tubes.—The National Tube Co. during the past week sold 14,100 Spellerized steel locomotive boiler tubes to the Delaware & Hudson railroad and 14,000 tubes of the same material to the Pennsylvania lines. These tubes will equip 30 locomotives for each line, and will be used instead of charcoal iron boiler tubes as heretofore used by these companies. The boiler tube market is very firm and discounts to customers remain unchanged.

Coke.—The coke market is very firm and there is a good demand for both furnace and foundry coke for spot shipment, although the demand for furnace coke is not as strong as it was a week ago. Production in the region is increasing, not so much on account of labor returning to the coke operations as from new plants going in. The labor situation in the Connellsville region is still bad and many of the plants are handicapped in drawing their coke. Furnace coke is quoted $2.75 to $2.80 at the ovens and standard 72-hour foundry coke, $3.24 to $3.40 at the ovens.

Old Material.—Scrap prices, considering the inactivity of the market, have held up better than would ordinarily be expected, but the market at best is nominal. The Carnegie Steel Co. has to a large extent cut out dealers in buying scrap, and during the past month has bought a considerable tonnage from railroad lists direct. A goodly share of this has been rails, which have been cut up and used in open-hearth furnaces, this serving a double purpose, keeping the old rails out of the hands of rerollers, and supplying needed material for its own operations. Many consumers of old material are not taking their contract tonnages, being able to buy in the market at this time at prices below their contracts. For delivery in the Pittsburg district, gross tons, we quote as follows:

Heavy melting scrap, $17.50 to $18; re-rolling rails, $18.75 to $19; bundled sheet scrap, $15 to $15.25; iron axles, $29.50 to $30; old iron rails, $22 to $23; No. 1 wrought scrap, $18.50 to $19; old car wheels, $24 to 24.50; low phosphorus scrap, $22.50 to $23; machine shop turnings, $14.25 to $14.75; axle turnings, $15.25 to $15.75; cast borings, $13 to $13.50; No. 1 cast scrap, $19.50 to $20.

CHICAGO.

Pig Iron Prices Decline and Those of Wire Products Are Advanced.

Office of THE IRON TRADE REVIEW,
1362 Monadnock Block, Sept. 3.

A decline ranging from 50 cents to $1 a ton in pig iron, and an advance of $1 a ton in wire products, constitute the main developments of an otherwise dull week. The depression in pig iron is very general, and inquiry is of an indifferent nature. Rail orders continue light, the week's sales of the local mill amounting to less than 10,000 tons. It is estimated that the uncovered requirements of the trunk lines aggregate 1,000,000 tons. Shafting has been irregular in price since the dissolution of the shafting association, and the abolition of selling zones. One large producer is now quoting 60 per cent off the list f. o. b. Pittsburg on car load lots, and 55 per cent on lesser quantities. Scrap is without important change, the market being weak.

Pig Iron.—A further drop of 50 cents a ton in northern, and $1 in southern irons for the last quarter is the principal development of the last week. This decline brings northern No. 2 foundry to the basis of $23.50 Chicago, and southern No. 2 down to $18 Birmingham. These prices apply strictly to shipments commencing Oct. 1. For September delivery the market ranges from $24 to $25 Chicago for northern No. 2, and from $19 to $19.50 Birmingham for southern irons. Aside from occasional carload lots for quick shipment, there is very little inquiry for iron for any delivery. One western melter has asked for prices on 5,000 tons of northern No. 2 for delivery in the new year, the purchase depending on the placing of a casting contract. While a comparatively stiff price was named on this tonnage, it was intimated that in the final negotiations the quoted price would be shaded. Northern No. 2 foundry for delivery in 1908 heretofore has been offered at a range from $21 to $21.50 Chicago. Southern No. 2 for the same delivery ranges from $17.50 to $18 Birmingham. Some malleable foundries in the west have been sounding the market on fourth quarter shipments, and a price as low as $21.50 valley furnace has been named on standard Bessemer, which nets $23.90 Chicago. On malleable Bessemer, local furnaces have not gone below $23.50 Chicago. High silicon irons continue in good demand, and prices are firmly maintained as below. Our quotations are for the fourth quarter:

Lake Superior Charcoal	$27.00 to 27.25
Northern Foundry No. 1	24.00 to 24.50
Northern Foundry No 2	23.50 to 24.00
Northern Foundry No. 3	23.00 to 23.50
Southern Foundry No. 1	22.85 to 23.35
Southern Foundry No. 2	22.35 to 22.85
Southern Foundry No. 3	21.85 to 22.35
Southern Foundry No. 4	21.35 to 21.85
Southern No. 1 Soft	22.85 to 23.35
Southern No. 2 Soft	22.35 to 22.85
Southern Gray Forge	20.85 to 21.35
Southern Mottled	20.35 to 20.85
Southern Silveries, 4 per cent silicon	23.35 to 23.85
Southern Silveries, 5 per cent silicon	24.35 to 24.85
Southern Silveries, 6 per cent silicon	25.35 to 25.85
Jackson Co. Silveries, 6 per cent	30.40
Jackson Co. Silveries, 8 per cent	32.40
Jackson Co. Silveries, 10 per cent	34.40
Malleable Bessemer	23.50 to 24.00

Billets and Rods.—An occasional inquiry for small lots of forging billets is the sum total of local interest in intermediate steel. Prices are without change as follows: Forging billets, $36 to $38, Chicago; rolling bilets, $29 Pittsburg; wire rods, $37 for Bessemer, and $38 for open-hearth, Pittsburg.

Merchant Bars.—A better inquiry for bar iron is felt. Specifications also are freer, and prices are uniform at $1.60 Pitsburg. Western mills report the tonnage in hand sufficient to run them into the fourth quarter, and their entire output going into immediate consumption. There is no change in the situation on steel bars. Specifications are continually in excess of production, and requests for anticipated shipments are numerous. Our quotations below are on car load lots, Chicago delivery:

Bar iron, 1.78c; soft steel bars and bands, 1.78c, half extras; soft steel angles, less than 3 x 3, 1.88c; hoops, 2.18c base, full extras; planished or smooth finished tire steel, 1.98c; iron finish, up to 1½ x ½ inch, 1.93c base; iron finish, 1½ x 1½ inch and larger, 1.78c base; channels for solid rubber tire, ¾ to 1 inch, 2.28c, and 1⅛ inch and larger, 2.18c; smooth finished machinery steel, 2.18c; flat sleigh shoe, 1.83c; concave and convex sleigh shoe, 2.08c; cutter shoe, 2.36⅛c; toe calk steel, 2.33c; railway spring, 1.98c; crucible tool steel, 7c to 9c, with higher prices asked on special grades. Quotations on shafting are revised to 60 per cent off the list f. o. b. Pittsburg for car load lots, and 55 per cent off for less than car load lots. On iron and steel bars from local stocks, we quote as follows: Bar iron, 2.25c full extras; soft steel rounds, and square, 3-inch and larger, $2 per 100-lbs. base; flats, 2 inches to 4 inches by ⅛ inch and larger, $2 per 100 pounds base; 4½ inches by 5 inches and 6 inches by 5-16 inch and thicker, $2 per 100 pounds base; all ovals, half rounds,

$2 per 100 pounds base; steel bands, $2 half extras; soft steel hoops, $2.50 full extras. Other sizes not mentioned above, $2 per 100 pounds base plus half extras.

Plates.—There is virtually no change in the situation, the market retaining all its strength and former conditions. Specifications and new business are heavy and deliveries are slow. Prices remain on the following basis:

Plates, ¼ inch and heavier, 6¼ to 100 inches wide, either universal or sheared, 1.70c to 1.90c Pittsburg base. For extras see Pittsburg report. Freight rate to Chicago, 18c per 100 pounds for carload lots, and 21c for less than carload lots. Jobbers' prices for shipment from local stocks are as follows: Tank steel, ¼ inch and heavier up to 72 inches wide, 2.20c; 3-16 inch up to and including 60 inches wide, 2.30c; 3-16 inch, 72 inches wide, 2.55c; No. 8 up to 60 inches wide, 2.50c. Flange steel, 25c extra; heads, 25c extra.

Sheets.—The volume of orders is in about the same proportion of former weeks this summer. Deliveries from local mills are easier, which is the only change noticeable. Prices are firmly maintained on the following basis:

Black sheets, Nos. 8, 9, and 10, 1.90c Pittsburg; No. 28, 2.60c Pittsburg. Galvanized sheets, No. 28, 3.75c Pittsburg. Freight to Chicago, 18c per 100 pounds for car load lots, and 21c for less than car load lots. Jobbers' prices on car load lots and less from store are as follows:

No. 10, 2.50c to 2.55c; No. 12, 2.55c to 2.60c; No. 14, 2.60c to 2.65c; No. 16, 2.70c to 2.80c; Nos. 18-20, 2.80c to 2.90c; Nos. 22-24, 2.85c to 2.95c; No. 26, 2.90c to 3c; No. 27, 2.95c to 3.05c; No 28, 3.05c to 3.15c; No. 30, 3.35c to 3.45c. Galvanized sheets, Nos. 10 to 20, 3.50c to 3.55c; Nos. 22 and 24, 3.65c to 3.75c; No. 26, 3.85c to 3.90c; No. 27, 4.05c to 4.15c; No. 28, 4.25c to 4.35c; No. 30, 5.40c to 5.45c.

Structural Steel.—It is reported that the general contract for the erection of the LaSalle hotel has been let to the Fuller Co. This building involves about 7,000 tons of structural shapes; the contract for the fabrication of this tonnage is yet to be let. The demand on mills for shapes continues heavy. The Illinois Steel Co. has its book capacity of the balance of the year specified, shipping instructions in hand for this material aggregating close to 60,000 tons.

No important contracts are reported by the American Bridge Co., although additional large projects have come up for figures. The most important is a new theater to be erected in down-town Chicago. Prices are firm as follows:

Beams and channels, 3 to 15 inches inclusive, 1.70c Pittsburg. For extras see Pittsburg report. Freight rate from Pittsburg to Chicago, 18c per 100 pounds for carload lots, and 21c per 100 pounds for less than carload lots. Quotations from store are as follows:

All angles, three inches and larger, including six inches, $2.10 per 100 pounds; angles, over six inches, $2.15 per 100 pounds base; beams, 3 to 15 inches inclusive, $2.10 per 100 pounds base; channels, three inches and larger, $2.10 per 100 pounds base. Less than carload lots are $1 a ton higher than foregoing prices.

Rails and Track Supplies.—A contract for 8,000 tons of heavy sections for an Oregon line, and another contract for 1,500 tons for an interurban line comprise the total rail sales of the week by the Illinois Steel Co. The Carnegie Steel Co. at Pittsburg is reported to have received an order for 37,000 tons of standard sections from the B. & O. for 1908 shipment. It is stated that the railroads have yet to buy in the neighborhood of 1,000,000 tons of rails before their 1908 requirements are completed. Track supplies and light rails are both moving freely, sales of the latter in the past month exceeding 4,000 tons. Our qoutations are without change, as follows:

Bessemer rails, $28 to $30; less than 500-ton lots, $32; open-hearth rails, $29; light rails, Bessemer, 30 to 45-pound sections, $34; 25-pound, $35; 20-pound, $36; 16-pound, $37; 12-pound, $38, and lighter sections down to 8-pound, $44.50, all f. o. b. mill. Track supplies vary in price according to quantity and delivery. On orders accompanying rail contracts for future delivery, we quote, f. o. b. Joliet: Angle bars, 1.65c; spikes, 2.25c; bolts with square nuts, 2.65c; with hexagon nuts, 2.80c. For carload lots or less, for prompt shipment, the following prices are asked: Angle bars, 2.25c to 2.75c; spikes, 2.40c to 2.50c; bolts with square nuts, 2.85c; with hexagon nuts, 3c.

Cast Iron Pipe.—None of the inquiries pending mentioned last week, aggregating 8,300 tons, has been closed. The Kansas City job will be let on the 3d; the DuQuoin has been withdrawn and will be re-advertised. Small lots of pipe are in frequent demand. We quote 4-inch water pipe, $38; 6 to 12-inch, $37; larger sizes, $36; gas pipe, $1 a ton higher.

Merchant Pipe and Boiler Tubes.—Mills state there is no diminution in the pressure of new business, and that a considerable tonnage is constantly lost to them because of their inability to ship in the desired time. While jobbers are doing a brisk business, they also are suffering because of difficulty in maintaining a full line of sizes in stock.

We quote mill discounts, Chicago delivery, car load lots, as follows: On steel pipe, jobbers are allowed a concession of one point and 5 per cent additional from the schedule in force:

MERCHANT PIPE.

	—Steel— Black.	Galv.
¼ to 6 inches, inclusive.....	71.5	61.2

BOILER TUBES.

	Steel.	Iron.
2¼ to 5 inches, inclusive....	62.2	49.2

Mill quotations on iron pipe are from four to five points higher than above. A concession of one point from the following quotations is allowed by Chicago jobbers on car load orders for shipment from local warehouse stocks. We quote for less than car load lots as follows:

MERCHANT PIPE.

	Black.	Galv.
⅛ to ¼ inch.....	60	44
⅜ inch	62	48
½ inch	64	52
¾ to 6 inches.....	68	58
7 to 12 inches.....	64	49

Minimum prices for wrought iron pipe, car load lots or greater, from Chicago stocks, are as follows: ⅛ inch to ¼ inch, 55; ⅜ inch, 57; ½ inch, 59; ¾ inch to 6 inches, 64; 7 inches to 12 inches, 59. Boiler tubes from store are unchanged at 60 off for steel, 47½ for iron, and 42½ for seamless, base sizes, 2¼ inches to 5 inches.

Wire Products.—An advance of $1 a ton is announced by the American Steel & Wire Co., effective Sept. 2, on nails, smooth and barb wire, staples, etc. We have revised our prices and quote to jobbers Chicago delivery, as follows: Wire nails, $2.23; painted barb wire, $2.38; galvanized barb wire, $2.68; smooth annealed wire, $2.08; smooth galvanized wire, $2.38; polished staples, $2.33; galvanized staples, $2.63. Car load lots to retailers, five cents higher; less than car load lots, 15 cents higher.

Coke.—The demand for coke shows a marked improvement. Both for spot and forward delivery, orders are coming in more freely than for several months. Connellsville furnace coke is held at $2.75 to $2.85 ovens, and 72-hour foundry coke at $3.25 upwards. The choice brands of the latter are firm at $3.50 ovens.

Old Material.—Viewing the situation as a whole, there is no perceptible change. Several round lots changed hands during the week under review, the purchases being made to complete contracts that expired

with the last day of August. Car wheels during the week sold as high as $25 Chicago, the market on these being stiff. No. 1 railroad wrought has declined to $14.25, and railroad malleable in lots of over 1,000 tons has sold as low as $15.75. Cast scrap is stronger, $17 Chicago being the present minimum price. Iron rails are weaker, $20 to $20.50 being the current local range. The C. & N. W. Ry. announces it will have about 1,200 tons of iron rails to offer in the next 60 days. It has a list of 1,300 tons of miscellaneous scrap out at the present time. The Erie R. R. is also asking prices on a new list of material. Cast borings and stove plate have each declined 25 cents a ton. The market is very soft and trading is light. We quote as follows, gross tons in the first paragraph:

Old Car Wheels	$24.50 to 25.00
Old Iron Rails	20.00 to 20.50
Rerolling rails (3 ft. and over)	16.75 to 17.00
Old Steel Rails (3 ft. and under)	17.00 to 17.50
Light Section Relayers, 45 lbs. and under, subject to inspection	30.00 to 32.00
Relaying Rails, subject to inspection	28.00 to 30.00
Frogs, Switches and Guards	15.50 to 16.00
Heavy Melting Steel	15.00 to 15.50

We quote net tons as follows:

No. 1 R. R. Wrought	$14.25 to 14.75
No. 2 R. R. Wrought	13.25 to 13.75
Knuckles, Couplers and Springs	14.50 to 15.00
Shafting	17.00 to 17.50
Iron Car Axles	23.00 to 23.50
Steel Car Axles	20.50 to 21.00
Dealers' Forge No. 1	11.75 to 12.00
Pipes and Flues	11.25 to 11.75
No. 1 Cast, 150 lbs. and less	17.00 to 17.50
No. 1 Mill	10.00 to 10.50
Mixed Busheling (Nos. 1 and 2)	10.50 to 11.00
Country sheet	8.00 to 8.50
No. 1 Boiler Cut	10.00 to 10.50
Boiler Punchings	14.00 to 14.50
Cast Borings	8.50 to 9.00
Mixed Borings, etc	8.50 to 9.00
Machine Shop Turnings	10.50 to 11.00
Railroad Malleable	15.75 to 16.00
Agricultural Malleable	14.25 to 14.75
Stove Plate and Light Cast Scrap	14.00 to 14.50
Old Iron Splice Bars	16.50 to 17.00

CLEVELAND.

Some Interest in 1908 Iron—Spot Foundry Weaker.

Office of THE IRON TRADE REVIEW, Browning Bldg. Sept. 3.

Iron Ore.—With reports from two-thirds of the docks at hand, a total shipment of over 6,000,000 tons for the month of August is indicated, as compared with 5,665,815 tons in August, 1906. The August shipment brings the season's total movement close to 24,000,000 tons, against 22,721,095 tons in 1906. Duluth, Superior and Two Harbors exhibit a splendid record of operations for the month, considering the labor shortage in the mines. The month's gain is almost entirely due to the activity at these ports. Escanaba, Marquette and Ashland, which by taxing their capacities, under the force of the strike troubles at the upper lake ports, established exceptionally good records in July, were not expected to show any substantial gains in August. The month's movement, as a whole, as indicated by the available figures, has been a very satisfactory one considering the operating difficulties.

Pig Iron.—The awakening of some interest on the part of buyers in iron for 1908 delivery has been the principal development in a market of extreme dullness. The few sales of small lots that have been made however, have displayed a tendency toward weakness, spot No. 2 foundry iron having been disposed of at a price of $22.50, Cleveland. This now appears to be the established price for this grade of iron. The inquiry for next year has been of the groping sort, prospective buyers appearing to desire to learn the sellers' ideas of prices before coming into the market. One inquiry out is for 1,000 tons for first half delivery. Another calls for 250 tons in monthly lots up to April, 1908. One interest states that it has esablished a minumum price of $21.50 Cleveland on No. 2 foundry for first quarter delivery. But few cases of requests to withhold shipments on contracts are reported and in the case of steel-making iron particularly, anticipations are being sought. Basic remains quiet, local sellers being filled up to Dec. 1. We quote f. o. b. Cleveland for the balance of the year as follows:

Bessemer	$23.15 to 23.25
No. 1 Foundry	23.00 to 23.50
No. 2 Foundry	22.50 to 23.00
No. 3 Foundry	22.00 to 22.50
No. 2 Southern	22.85 to 23.35
Gray Forge	21.50 to 21.75

Coke.—Increasing stiffness is noted in the market and the difficulties of procuring well-known brands are greater. Furnace coke is especially strong and it has become a hard matter to buy tonnages under $3 ovens. We quote furnace coke for the balance of the year at $3 and foundry coke from $3.25 to $3.50.

Finished Material.—While the month of August in its aggregate of specifications to one of the largest producing interests, was less than July, the variety of manufacturing lines represented by the former was greater. This is regarded as holding forth a more encouraging indication of general business conditions. Futhermore shipbuilders specified particularly heavy in July. New business for this producer at the end of August was in greater volume than at the start. Current specifications generally are in fair tonnage and new business is light. Structural and steel bars are being strongly taken on contracts. Automobile and vehicle manufacturers have begun to specify for spring steel and implement makers also continue to draw upon their ordered tonnage. Boat steel is being actively used. Bar iron remains especially weak and some mills which have a fair tonnage of forward business on their books are declining to meet the market. Warehouse business continues good.

Old Material.—With the arrival of Sept. 1, when numerous contracts expired, a decided slump in old material has developed. Cancellations of unfilled contracts on the part of the mills are numerous, the latter appearing in many cases to be anxious to get free of their obligations. Offerings are plentiful and the market exhibits signs of further weakness. The railroad lists of the week comprise accumulations by the Pennsylvania lines west, Wheeling & Lake Erie, Erie and the T. & O. C. with a small lot of 300 tons. We have revised our prices and quote f. o. b. Cleveland, gross tons, as follows:

Old iron rails	$21.50 to 22.00
Old steel rails (re-rolling)	17.50 to 18.50
Old steel rails (under 6 feet)	17.50 to 18.50
Old car wheels	22.50 to 23.50
Steel boiler plate	14.00 to 14.50
Steel axles	21.00 to 22.00
Malleable iron (railroad)	18.00 to 18.50
Malleable iron (agricultural)	15.00 to 16.00
Heavy steel	16.00 to 16.50
Country mixed steel	14.00 to 14.50
Low Phosphorus	20.00 to 21.00

We quote net tons as follows:

No. 1 R. R. wrought	$16.00 to 16.50
No. 1 busheling	14.00 to 14.50
No. 1 machine cast	17.50 to 18.50
Iron axles	23.00 to 24.00
Axle turnings	12.50 to 13.00
Machine shop turnings	11.00 to 11.50
Grate bars	14.00 to 14.50
Pipes and flues	12.50 to 13.00
Tank iron	12.00 to 12.50
Hoop and band iron	8.00 to 8.50
Sheet iron	7.00 to 8.00
Wrought drillings	11.00 to 11.50
Stove plate	14.00 to 14.50
Cast borings	10.50 to 11.00

CINCINNATI.

Pig Iron Prices Decline Fully One Dollar—Sales for Prompt Shipment.

Office of THE IRON TRADE REVIEW, 124 Government Place, Sept. 3.

Pig Iron.—Prices are irregular and sales have been made fully one dollar per ton lower than last week. Interest is almost entirely confined to spot iron. An Ohio melter bought 500 tons of No. 2 foundry this week at $18 Birmingham and at the close of the week this price is said to have been shaded in one instance. Another sale of 1,000 tons for prompt shipment is reported consisting of part No. 2 and part No. 4 foundry at about $18 for the No. 2 and $16 Birmingham for No. 4. Some Ohio malleable iron is reported sold at $21 at furnace and northern foundry iron in the Ironton district is reported to be obtainable at $21 at furnace for No. 2. The low grades are dull and weak and gray forge is quoted at $15.75 and mottled at $15.50 Birmingham. The

low prices for the higher grades were mainly established by trading in resale iron, but low grades are accumulating at southern furnaces and are freely offered with some pressure. There have been sales at higher figures than above named which are minimum prices so far as can be learned, but the market is decidedly ragged and any quotations are liable to come out within a range of a dollar per ton. We quote for prompt delivery delivered Cincinnati as follows:

Southern Foundry No. 1	$21.75 to 22.25
Southern Foundry No. 2	21.25 to 21.75
Southern Foundry No. 3	20.25 to 20.75
Southern Foundry No. 4	19.25 to 19.75
Southern No. 1 Soft	21.75 to 22.25
Southern No. 2 Soft	21.25 to 21.75
Southern Gray Forge	19.00 to 19.25
Northern No. 1 foundry	22.70 to 23.20
Northern No. 2 foundry	22.20 to 22.70
Northern No. 3 foundry	21.20 to 21.70

There is nothing doing in forward business. An occasional inquiry for a small tonnage appears, but sales are few. Prices for forward delivery are not quotable, as any inquiry of importance would have to be a matter of negotiation. The last quarter is regarded as about on the same basis as spot iron since the declines of this week. For next year there is no quotable basis.

Melters are taking iron on contracts and there is nothing reported that would indicate a falling off in the consumption. The decline in the market to $18 for spot iron will be calculated to stop the free offerings of resale iron, as much of the iron coming forward now is contracted for at $18.50, which would make reselling unprofitable. Unless furnaces follow the spot market to the $18 basis freely, there is some likelihood of a stronger spot market, should the resale iron disappear. On the other hand, a further decline in prices would be calculated to cause hold up on shipment orders with buyers declining contract iron and buying the spot. The weakness in the market has brought to light several concerns that are not covered for the balance of the year and the quantity of pig that will be needed by uncovered consumers is regarded as the factor in the situation that will determine prices for the next four months. We quote for last quarter, delivered Cincinnati, as follows:

Southern Foundry No. 1	21.75 to 22.25
Southern Foundry No. 2	21.25 to 21.75
Southern Foundry No. 3	20.25 to 20.75
Southern Foundry No. 4	19.25 to 19.75
Southern Foundry No. 1 Soft	21.75 to 22.25
Southern Foundry No. 1 Soft	21.25 to 21.75
Gray Forge	19.00 to 19.50
Northern Foundry No. 1	22.70 to 23.20
Northern Foundry No. 2	22.20 to 22.70
Northern Foundry No. 3	21.20 to 21.70

Finished Material.—There is a fair run of small orders from stock, but mill orders for forward delivery are light. Mills are catching up on orders and specifications are easier to get through for earlier delivery in some lines than has been the case for some time. Small orders from stock are filled here at the following prices:

Angles, 3 x 3 and over, 2.15c to 2.25c; beams and chanels, 15 inches and under, 2.15c; small angles and architectural channels, 2.10c base; plates ¼ inch and heavier, 2.10c; 3-16 inch, 2.20c; No. 8, 2.20c; sheets (blue annealed) No. 10, 2.30c; No. 12, 2.35c; No. 14, 2.40c; No. 16, 2.50c; box annealed sheets, No. 18 and 20, 2.65c; Nos. 22 and 24, 2.75c; Nos. 25 and 26, 2.80c; No. 27, 2.85c; and No. 28, 2.95c. Iron and steel bars, $2 base; boiler tubes, 62 per cent off base; turnbuckles, 45 per cent off; rivets, 3.15c base; cold rolled shafting, 45 per cent off list; steel tire, 2.10c base.

Coke.—There is a better tone in the market with more inquiry and some good sized foundry and furnace contracts are under consideration. Coke operations are less eager to take on business and prices are losing elasticity. While the market is not quotably higher, quotations are generally well maintained. Quotations in the leading coke producing districts are as follows:

Wise County, Va., Furnace Coke, prompt shipment	$2.50 to 2.65 per ton
Wise County, Va., Foundry Coke	3.00 to 3.25 per ton
Pocahontas Furnace Coke, prompt shipment	2.50 to 2.65 per ton
Pocahontas Foundry Coke	3.00 to 3.25 per ton
Connellsville Furnace Coke, prompt shipment	2.40 to 2.50 per ton
Connellsville Foundry Coke	3.00 to 3.50 per ton
New River Foundry Coke, prompt shipment	3.00 to 3.50 per ton
New River Furnace Coke, contract	2.85 to 3.00 per ton

Old Material.—The market is quiet and unchanged, but the undertone is easy. Dealers' prices here are as follows:

Old No. 1 R. R. wrought net tons	$16.00 to 17.00
Cast machine and fdy, net tons	18.50 to 19.00
Old iron rails, gross tons	22.00 to 23.00
Old steel rails (re-rollin~ gross tons	18.00 to 19.00
Old short lengths, gross tons	19.00 to 20.00
Old iron axles, net tons	25.00 to 26.00
Heavy melting scrap, gross tons	18.00 to 19.00
Stove plate, net tons	14.00 to 15.00
Wrought turnings, net tons	12.00 to 13.00
Cast borings, net tons	10.00 to 11.00
Car wheels, gross tons	23.00 to 24.00

PHILADELPHIA.

Increase in Business Does Not Check Decline in Prices.

September 3.

Pig Iron.—There was a noticeable increase in the amount of business done during the past week over the several weeks preceding, but it was not sufficient to check the decline in prices which has been in progress. Producers and consumers are evidently getting daily nearer to the point where a large buying movement will start, and if the furnaces are to make any money, prices cannot be much below the level already reached. Some very low prices have been made, and rumor quotes some even lower than have probably been made. Thus it is said that two Lehigh Valley interests have been selling No. 2X foundry for $18 and $19, but no confirmation of such figures can be obtained. The ruling figure for No. 2 is about $21.50, and it is doubtful if any sales have been made under $21.25 for standard brands. Basic and gray forge have been weak because of lack of demand, but low phosphorus is strong and sales are pretty much confined to September delivery, but some fourth quarter business is reported. Many producers are inclined to believe that bottom has been about reached and that the present month will see the beginning of improvement, if not in prices, at least in orders. Collections are in fairly good shape, and there has been no complaint from foundrymen of lack of business. With a more hopeful tone from Wall Street, it is believed that the worst has been passed. Prices may be quoted about as follows:

No. 1X Foundry	$22.00 to 22.50
No. 2X Foundry	21.25 to 21.75
No. 2 Plain	20.75 to 21.25
Standard Gray Forge	18.50 to 19.25
Basic	19.75 to 20.25
Low Phosphorus	27.00 to 27.50

Finished Material.—There has been no change from last week. New business is light in most lines, but there is a good demand for structural material. Prices remain as follows:

Old Material.—A little more buying by the mills has strengthened the prices of certain grades of scrap, but the improvement is not general, and the market as a whole is dull and quiet. The fact that it holds pretty firmly is taken, however, as a hopeful sign of improvement in the near future. Prices may be quoted as follows:

Old steel rails	17.50 to 18.00
No. 1 steel scrap	16.25 to 16.75
Old steel axles	20.00 to 21.00
Old iron axles	27.00 to 28.00
Old iron rails	20.00 to 21.00
Old car wheels	22.00 to 23.00
Choice scrap R. R. No. 1 wrought	17.75 to 18.25
No.1 yard scrap	16.25 to 16.75
Machinery scrap	19.00 to 20.00
Low phosphorus scrap	21.50 to 22.00
Wrought iron pipe	14.75 to 15.25
No. 1 forge fire scrap	14.00 to 14.50
No. 2 forge fire scrap, ordinary	10.00 to 10.50
Wrought turnings	14.00 to 14.50
Axle turnings, heavy	14.50 to 15.00
Cast borings	12.75 to 13.25
Stove plates	14.00 to 14.50

Will Increase Capacity.—The Keystone Steel Casting Co., Chester, Pa., is about to increase its capacity by the erection of two additional annealing furnaces, made necessary by the rapid increase of its business. The contract has been awarded.

NEW YORK.

Heavy Sales of Structural Material Last Month—Pig Iron Very Dull.

Office of THE IRON TRADE REVIEW, Room 1005, 90 West St., Sept. 3.

Pig Iron.—The past week has been one of the most quiet of the summer in this district. Following the limited spurt of inquiry reported a week ago, the market has assumed a state of stagnation, broken only occasionally by some consumer buying to cover imperative needs or by some furnace interest testing out the market. Inventory-taking and the approach of the vacation season's end have combined with the belief on the part of melters that lower figures will prevail later to produce this inactivity. It appears that the brisk competition recently entered into by two eastern producers with the idea of filling up their order books has served its purpose. These order books are full, and incidentally the extremely low prices made have weakened the eastern market to such a degree that it is now impossible to give representative quotations, each sale creating a market of its own. As is usual during the heated season, furnaces have been turning out a great deal of off-iron, as a consequence of which certain sellers report a better demand for high grade irons than for the lower. One interest having a limited tonnage of Scotch on its hands recently tried out the market at $20, furnace, and the iron was snapped up without delay. Sales of No. 2X are being made as high as $21, furnace, on the one hand, and lower than $20, furnace, on the other. The leading steam pump interest is reported to have secured very low figures on a lot of iron in New England, but it develops that this was a re-sale proposition. The leading pipe manufacturer has been given extremely attractive prices on a considerable tonnage of gray forge. British stocks of No. 3 Middlesbrough on Aug. 22 were down to 184,000 tons; the week opened at 56s 1½d. Tidewater prices, largely nominal, may be given as follows:

Northern Foundry No. 1	$21.50 to 22.00
No. 2X Foundry	20.50 to 21.00
No. 2 Plain	19.50 to 20.00
No. 2 Southern Foundry	22.00 to 23.00
Basic	20.00 to 20.50

Ferro-Manganese.—The situation continues quiet, with no change in quotations from those reported a week ago, $60 at the seaboard for prompt delivery, and $59 for later shipment.

Finished Materials.—The American Bridge Co. reports bookings the past month as 53,000 tons, the heaviest August in its history. September has started off light, but a number of good projects are pending, including 10,000 tons for the Oliver building in Pittsburg, 1,800 for an office building in Texas, and 1,500 for a similar structure in San Francisco. New York's difficulties in disposing of its bonds have been largely responsible for a lessening of activities here. In the way of new inquiry the week has produced little. The New York Central has asked for bids on a suburban station and freight sheds, involving a good tonnage. Much interest attaches to the sale of 5,000 tons by the American Bridge Co., as reported a week ago, for the construction of piers at Duluth. This is the first use of steel in lake ore piers and the experiment is attracting wide interest, as its success will doubtless lead to many later projects of this kind. The same interest has also booked 4,000 tons for the new billet mill of the Indiana Steel Co. Considerable export work is to be placed shortly. Chile is inquiring for a round tonnage of railway bridges, and Cuba for a number of highway bridges. In cast iron pipe the situation is quiet, the tightness of the money market, particularly as regards municipal bonds, holding up many contemplated projects. The recent New York City letting, involving about 4,000 tons, went to James H. Holmes, and it is understood the pipe will be furnished by the United States Cast Iron Pipe & Foundry Co. Brewster, N. Y., lets a small tonnage today. We quote as follows: Angles, 3 to 6 inches x ¼ inch and heavier, 1.86c; beams, 3 to 15 inches, 1.86c; tees, 3 x ¼ and heavier, 1.91c; plates, carloads, tank, 1.96c; marine boiler, 2.26c; bar iron, 1.81c; soft steel bars, 1.76c; sheets, No. 28, black, 2.60c.

Old Material.—As in other lines, the current scrap market is essentially a "buyer's market." In some lines it is probable that bottom rock has been reached, but the general tone is lower, with business very small. We quote New York delivery, gross tons, as follows:

Old iron rails	$24.50 to 25.00
Old steel rails, rerolling	18.00 to 18.50
Relaying rails	27.00 to 27.50
Old car wheels	23.50 to 24.00
Old iron car axles	26.00 to 26.50
Old steel car axles	19.00 to 19.50
Heavy melting steel	14.50 to 15.00
No. 1 railroad wrought	17.00 to 17.50
Iron track scrap	16.00 to 16.50
Wrought pipe	11.75 to 12.25
Cast borings	10.00 to 10.25
Wrought turnings	11.50 to 12.00
Heavy cast scrap	17.00 to 17.50
Railroad malleable	16.50 to 17.00
Agricultural malleable	15.00 to 15.50
Stove plate	13.50 to 14.00
Grate bars	13.00 to 13.50

BUFFALO.

Sales Are Few and Indications Point to a Decline in Prices.

September 2.

Pig Iron.—Sales are still very light in volume and about the only calls for prompt delivery are from buyers who are still stringing along on old contracts. And athough the present conditions indicate a decline in prices, it is not expected the reduction will be sufficient to cause alarm.

Local representatives of valley irons report first quarter, 1908, prices at from $21.50 to $22, which, with freight rates added for delivery in this territory, are practically the same as they have been for some time, as a glance at past quotations will indicate.

Predictions of continued scarcity of money seem to give many buyers additional excuse for delaying their purchases until the last minute, and that considerable uncertainty as to the future exists among the buyers, is evidenced by their diminutive purchases. However, very few buyers report any serious let-up in business, and most of them admit that they are running close and will be obliged to make further purchases before long.

Comparison of figures with a year ago shows a remarkable feature in the present situation, in the fact that the deliveries of July and August were at a rate nearly equal to the rate of sales during the extraordinarily heavy buying movement this time last year.

Owing to the wide difference of opinion among furnace men and the present conflicting predictions, it is difficult to characterize a market just now. There is little business going and no material change anticipated. Hence prices cannot be given with any great exactness, but the following scale is considered a fair one:

No. 1X Foundry	$22.75 to 23.00
No. 2X Foundry	22.00 to 22.50
No. 2 Plain	21.50 to 22.00
No. 3 Foundry	21.75 to 22.00
Malleable Bessemer	22.00 to 22.50
Gray Forge	21.00 to 21.50
Charcoal	27.00 to 27.50

ST. LOUIS.

Market Quiet, but Prices Higher than in Some Sections.

Sept. 2.

Pig Iron.—The pig iron market is quiet in the St. Louis territory. Few orders are being placed, and only for spot iron. The lowest figures quoted in this district on No. 2 southern is $19.50, Birmingham basis, for prompt shipment. The prevailing quotation for prompt shipment is $20. The furnace that quoted $19.50 had accumulated a small tonnage in yards

and wished to dispose of it. Silvery is plentiful and can be had for $21.50 to $22, Birmingham, for 4 to 5 per cent silicon. The prevailing price for this year for No. 2 Birmingham is $19. Nothing less than $18.50 has been quoted for shipment for the first quarter and first half of 1908. No orders of consequence were placed during the week, but buying is expected to begin soon. Our quotations, f. o. b. Birmingham, for spot shipment, to which freight of $3.75 is to be added, follow:

No. 1 Southern	$20.00 to 21.00
No. 2 Southern	19.50 to 20.00
No. 3 Southern	19.00 to 19.50
No. 4 Southern	18.00 to 19.00

Coke.—The coke market is strong, and quite a good many orders are being placed for foundry coke, both for immediate and future shipment. Prices are firm at $3.40 to $3.60 for 72-hour Connellsville coke, f. o. b. ovens, and at $2.75 to $3.00 for furnace. The freight rate to East St. Louis is $2.80, and to St. Louis, $2.90.

Old Material.—The scrap iron market is still demoralizingly dull. Our quotations follow:

	GROSS TONS
Second-hand Relaying Rails, according to time of delivery	$29.00
Steel rails (less than 3 feet)	15.00
Car wheels	21.00
Re-rolling steel rails	16.00
Heavy melting steel	15.00
Country steel mixed	12.00
Iron rails	22.00
	NET TONS
No. 1 R. R. wrought	$15.00
No. 2 R. R. wrought	14.00
Iron splice bars and fish plates	16.00
Iron car axles	22.00
Steel car axles	19.00
Iron shaftings (3 to 6 inches)	18.00
Country wrought	12.00
Locomotive tires, smooth inside	15.00
Pipes and flues	12.00
Heavy machinery	15.00
R. R. cast (less than 300 pounds)	14.50
No. 1 Busheling	13.00
No. 2 Busheling	12.00
Boiler sheet and rings	12.00
R. R. cast borings (free of inferior quality)	10.00
R. R. wrought turnings	13.50
Machine shop turnings (free from brass)	10.00
Railroad malleable	15.00
Agricultural malleable	14.00
Cast stove plate	11.00

BIRMINGHAM, ALA.

Prices Lod and Business Dull, But Hopeful Feeling Prevails.

Sept. 2.

Notwithstanding that the prices of pig iron in the southern territory are off, no less than a dollar per ton as compared to the prices that prevailed for several months past, the mart is a little quiet yet. There is a hopeful air noticed, however, that in the next fortnight, the buying will pick up and with the change a better feeling prevail on all sides. The furnace companies have orders on which will keep them busy through the balance of the year at least. There can be no accumulation of iron to amount to anything. A few straggling orders are being received now, mostly for delivery during the fourth quarter of the year. Some inquiry is noticed and in several instances round lots are wanted for delivery during the first half of the coming year.

No. 2 foundry for delivery during the first half of the coming year is quoted at $17.50 per ton. For delivery during the fourth quarter of this year, No. 2 foundry is priced at $18 to $18.50 per ton.

BRITISH IRON MARKET.

Fall in Prices of Pig Iron Nothing Like That in America.

Office of THE IRON TRADE REVIEW, Prince's Chambers, Corporation St., Birmingham, Eng., Aug. 24.

A fairly steady condition has to be reported with regard to pig iron. The quietude of America is fairly reflected here, but there has been nothing like the same fall in prices. We have nothing at all corresponding to the drop of a dollar in Chicago pig iron. Today's quotations for Middlesbrough pig iron is 56s 8½d ($13.87), while on Thursday it was 57s ($13.94). There is hardly any buying going on at present, but there are important exceptions, some Germans being optimistic enough to cover their requirements until March next. It is significant that the shipments so far have equaled those of July. The reduction in stocks is now very slow, today's total being 193,033 tons. But everyone believes in the coming of the atuumn revival, and for a holiday month August has left hardly any room for complaint, Many contracts for pig must be renewed shortly. The only concession in price is by Northampton houses. Nottingham is showing a recovery of about 6d to 1s per ton, and South Staffordshire makers hold firmly to recent figures. Canada is still a buyer of pigs, though American orders have for the time being ceased. We are at the present time sending to Germany, Belgium, France and Italy.

METAL MARKET.

NEW YORK.

Sept. 3.

Copper.—In the face of a constantly declining market, there are many current rumors that within a few days the larger producers will meet and establish a selling price that will be satisfactory to the views of consumers and will result in the placing of long-deferred requirements. The past week has brought out no buying of importance, the hand-to-mouth program prevailing generally, as stocks in most instances are low. Prices have sagged steadily, the present nominal level being: Lake, 17½c to 18½c; electrolytic, 17c to 17½c; casting, 16½c to 17c.

Pig Tin.—The London market during the week took an upward turn on the report of heavy purchases by the leading American consumer, but lost the advance in a break at the end of the week. The domestic market was featureless throughout the week, Friday's price of 36½c for spot being the lowest of the year. Nominally, however, the market is somewhat above this figure, retail lots going as high as 37½c.

Pig Lead.—The leading interest continues to maintain its price of 5.25c for desilverized, though outside producers are selling as low as 5.10c, New York, and are shading 5c at St. Louis. Some accumulations of stocks are reported.

Spelter.—Galvanizing concerns are still liberal purchasers, but the demand from brass manufacturers has largely decreased. The market is weaker at 5.55c to 5.60c, New York, and 5.40c to 5.45c, St. Louis.

Antimony.—There is some curtailment of production which will help the situation, but the accumulations of stocks will hold the market weak until they are disposed of. Nominal quotations are: Cookson's, 10½c to 11c; Hallett's, 9¼c to 9¾c; ordinary brands, 8½c to 9c.

CHICAGO.

Sept. 3.

Demand for metals is light. Prices are soft, copper having declined 1½c and pig tin 2¼c per pound. We quote as follows: Casting copper, 19½c to 20c, car load lots for prompt shipments; Lake, 20¾c to 21¼c; pig tin, car lots, 38¾c; small lots, 39¼c; lead, desilverized, 5.75c to 5.85c for 50-ton lots; corroding, 6.40c to 6.50c for 50-ton lots; car lots, 2¼c per 100 pounds higher; spelter, 6.10c. Cookson's antimony, 16c, and other grades, 15c to 15½c; sheet zinc, $7.75 list f. o. b. LaSalle in car lots of 600-pound casks.

Old metals show sympathy with new in their downward tendencies. We quote as follows: Copper wire, 15c; heavy copper, 15c; light copper, 14c; heavy red brass, 14c; heavy yellow brass, 11c; light brass, 8c; No. 1 red brass borings, 11c; No. 1 yellow brass borings, 9c; brass clippings, 11c; tea lead, 3¾c; zinc scrap, 4c; zinc clippings, 4.25c; tin foil, 28c; tin pipe, 33c; pewter, 25c; aluminum clippings,

31c; aluminum cast scrap, 28c; electrotype plates free from wood, 5c; electrotype dross, 3¼c; stereotype plate, 6c; stereotype dross, 3½c; prime slab zinc dross, $80 per ton.

ST. LOUIS.

Sept. 2.

Lead and Zinc.—Quite a number of mines were closed down Saturday night in accordance with the decision arrived at by producers Friday night to restrict the output of the district. It is the intention of the producers to keep these mines closed down throughout September, and perhaps longer, and it is by no means certain that other mines will not be closed. Many of the mine owners who joined in the closing down move assert that they cannot be operated at a profit at prevailing prices, and none is making sufficient margin to insure a profit every week.

A loss of $20 per ton on lead has produced the trouble. This metal is much lower than it was a year ago, while zinc is only $2 per ton lower. On account of the difference in the production of the two metals, however, $2 reduction on zinc represents a proportionately greater loss than six times the amount on lead, the two metals being joined in practically that ratio. The highest price paid for zinc was $46 per ton on an assay base of $40 to $43 per ton of 60 per cent zinc. Heavy buying was the leading feature of the lead market, prices ranging from $56 to $62 per ton, according to grade.

IRON SHEET AND PLATE EXPORTS INCREASE.

The exports of iron sheets and plates continue to exhibit substantial gains. In July, 1907, the total shipments were 4,078 gross tons, against 2,462 gross tons in June, 1907, and 1,114 gross tons in July, 1906. The total exports for the seven months ending July, 1907, were 22,099 gross tons, against 6,600 gross tons in the period ending July, 1906, and 3,492 gross tons in 1905. In steel sheets and plates the July exports were 4,959 gross tons, against 7,517 gross tons in June, 1907, and 7,493 gross tons in July, 1906. The total figures for the corresponding seven months were 52,099 gross tons in 1907, 52,082 gross tons in 1906, and 36,304 gross tons in 1905.

Steel Rail Exports.—In July the exports of steel rails were 37,705 tons, against 18,358 tons in June, and 23,623 in July, 1906. For the seven months the totals were 180,720 tons in 1907, 203,352 tons in 1906 and 155,194 tons in 1905.

Iron Ore Imports.—Iron ore receipts from foreign countries are gradually rising. The shipments of the United States in July were 121,844 tons dutiable, against 70,508 tons dutiable in June, and 75,429 tons dutiable in July, 1906. For the seven months the totals were 726,432 tons dutiable in 1907, 643,690 tons dutiable in 1906, and 506,418 tons dutiable in 1905.

Pig Iron Imports.—The ratio of gain shown by pig iron imports for the past two years is being maintained. The receipts in July were 53,993 tons dutiable, against 44,885 tons dutiable in June, and 37,509 tons dutiable in 1906. The current year up to July shows 385,829 tons dutiable, against 184,322 tons dutiable in 1906, and 109,416 tons dutiable in 1905.

Crude Steel Imports.—In crude steel July showed imports of 1,297 gross tons, against 903 gross tons in June, 1907, and 1,050 gross tons in July, 1905. The imports for the seven months were 9,088 gross tons in 1907, 11,658 gross tons in 1906, and 7,970 gross tons in 1905.

DONATIONS TO WINONA INSTITUTE.

William Lodge, chairman of the committee of the National Metal Trades Association on securing support and donations for the Winona Institute trade school, has received up to date the following contributions:

Advance Machinery Co., Toledo, O., glue heater.

B. F. Barnes & Co., Rockford, Ill., 12-inch upright sensitive drill; 20-inch lever drill.

Brown Ketchum Iron Works, Indianapolis, Ind., $100 per annum for four years.

Lidgerwood Mfg. Co., Brooklyn, N. Y., one scholarship.

Diamond Chain Mfg. Co., Indianapolis, Ind., $100.

Hanna Engineering Works, Chicago, Ill., $50 per annum for four years.

Hisey-Wolf Machine Co., Cincinnati, O., Type "A" portable electric tool post grinder.

Norton Grinding Co., Worcester, Mass., No. 1 tool and cutter grinder.

Charles Parker Co., Meriden, Conn., three 5-inch vises, No. 273.

Pope Motor Car Co., Indianapolis, Ind., one scholarship.

Schumacher & Boye, Cincinnati, O., 20-inch by 8-inch lathe.

Union Special Machine Co., Chicago, Ill., $50 per annum for four years.

Watson-Stillman Co., New York, $25 per annum for four years.

Safety Emery Wheel Co., Springfield, O., wet tool grinder.

E. C. Atkins & Co., Indianapolis, Ind., $100 per annum for four years.

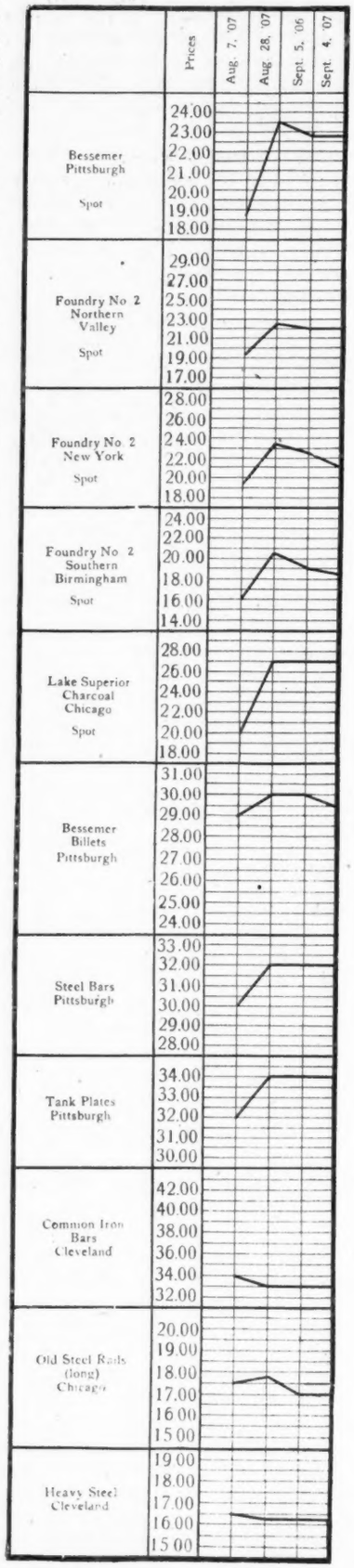
Keyless Lock Co., Indianapolis, Ind., $100 per annum for four years.

Lodge & Shipley Machine Tool Co., Cincinnati, O., 24-inch by 12-inch lathe.

Bucyrus Co., South Milwaukee, Wis., $100 per annum for four years.

Edgar S. Cook, president of the Warwick Iron & Steel Co., Pottstown, Pa., brands as untrue the report that he is interested with other capitalists in the reopening of the old Middle Mine Holes in Warwick township, Chester county, Pa. The company has purchased some of the ore, but has no connection with the project of reopening the mine.

PRICE CHART.



HEAVY ORE SHIPMENTS.

(Continued from page 359.)

reach working men on the mining property. No trouble of any seriousness has occurred, though the same precautionary measures are still being maintained at the mines. The importation of labor continues.

Mining Notes.

The state tax commission, who will in the near future fix the assessed valuation of the mines in Minnesota, has just completed an investigating trip which included every property on the Minnesota range. The work of the commission seems to have been done very thoroughly, and in addition to its own investigation, the commission has appointed a meeting at which all of the mine operators have been invited to appear and present whatever they may desire in reference to an equitable valuation of their property.

The new valuations bid fair to be on a fairer relative basis for the various mines than ever before, owing to the knowledge the commission has gained in regard to the real factors in determining the value of a mine, and it is expected that the mining cost, quality of ore, the proportion of drilled and unexplored deposits and the individual characteristics of each mine will be considered, so that, while it is probable that in general valuations will be raised, some will be lowered. The investigation has also brought out what was stated in these columns at the beginning of the year, that the amount of ore in the Hill lands had been commonly exaggerated, and it is now estimated at 175,000,000 tons.

The new four compartment shaft at the Tobin mine was begun a week ago and is located in the northeast corner of the northeast of the southwest of section 31 near the old Columbia mine spur. The shaft will be one of the largest in the Crystal Falls district and will be put down to a depth of 800 feet.

The Wacoutah mine near Mountain Iron, which has not shipped any ore this year, pending the completion of the spur and approach in from the Duluth, Mesabi & Northern tracks, resumed shipping last week with an output of 25,000 tons.

The Kellogg mine is offering premium wages in order to insure a full crew continually. The Kellogg was scheduled to ship 100,000 tons this season, but owing to quicksand delays in sinking the shaft, no ore has been shipped as yet.

The first ore has been shipped from the Hartley pit of the Steel Corporation. The shipments this season will probably not be very heavy, as the preparatory stripping has not been completed as far as desired, even for the beginning of shipping.

The old Boston mine adjoining the American, which was reopened last year by M. A. Hanna & Co., has just been bought by the same concern and will be operated in conjunction with the American, the two being connected by a drift. The Boston is near Clarksburg and about 10 miles from Ishpeming, and was last operated about 20 years ago. Its workings were unwatered in pumping out the American, and, although a smaller property than the other, it can be economically operated at the same time.

Options have been taken by Detroit interests on the Conrad and Bessie mines and they are being explored and pumped out with a view to again opening them up if the prospect appears favorable. The Conrad was operated about 15 years ago, and has two shafts and an open pit from which ore of very good quality has been taken. The Bessie was operated by the Steel Corporation and given up.

Gets Furnace Contracts.—P. J. Brown, Cleveland, has just closed a contract for the entire brick work of the new furnace of the Hamilton Iron & Steel Co., Hamilton, O. The construction of the stack is being pushed and it is expected that it will be blown in by February, 1908. Mr. Brown is also building two stoves for the furnace of the Detroit Iron & Steel Co., Detroit.

San Francisco's Building.—The value of building permits issued at San Francisco in August aggregated $2,971,125, making the total value of permits issued since the fire of $81,221,745. Real estate sales numbered 612 of the value of $1,700,000. The city bank clearing were $184,151,723.66. against $180,844,594.75 in August, 1906, and $155,841,918.86 in August, 1905. Customs receipts were $840,282.82.

	—August—		—Season—		—Increase—	
	1907.	1906.	1907.	1906.	Month.	Season.
Duluth	2,051,280	1,601,941	7,202,645	6,584,272	449,339	618,373
Two Harbors	1,320,142	1,310,782	4,752,063	5,161,725	9,360	*409,662
Superior	1,334,790	906,960	4,416,454	,578,496	427,830	837,938
Totals	4,706,212	3,819,683	16,371,162	15,324,493	886,529	1,046,669

*Decrease.

COAL SCARCE

And Prices Will Be High on the Pacific Coast—New Harvester Plant.

(Special Correspondence.)

Seattle, Wash., Aug. 28.—Coal, both for industrial and domestic purposes, will be extremely scarce and high on the Pacific coast during the coming winter. This condition results from the rapid growth of the coast country, which growth has completely outstripped the ability of the mines to produce coal and of the railroads to haul it after it has been mined. Washington and Oregon experienced a severe shortage last winter; it was hoped that during the summer the situation would be improved and the stocks replenished, but this has not been done. State Coal Mine Inspector McDermott for Montana reports as a result of his recent inspection of the mines of Montana that coal is being shipped out as fast as it is being mined, there are no reserve stocks on hand, labor is scarce and heavy railroad traffic has required more coal for transportation purposes than ever before. The Northwestern Improvement Co. and the Pacific Coast Co., the largest coal miners in Washington, admit practically similar conditions on their properties; the big New Castle, Black Diamond and Roslyn mines have been running short handed all summer. With mines but 70 miles from Seattle coal is now costing $4.50 per ton in car lots in that city; a similar quality can be bought in St. Paul for $4.25 after having been hauled 2,600 miles. Coke is also scarce, but most of the foundrymen have wisely laid in heavy stocks; so it is not expected that the shortage will affect them very materially. Coke and coal prices will be high and firm throughout the winter; deliveries will be slow.

The new plant of the Spokane Harvester Co. of Spokane, is now in operation. The plant includes the following buildings: Erecting shop 60 by 208 feet; wood and fitting shop 60 by 128 feet; machine shop 60 by 128 feet; foundry 80 by 128 feet. The internal transportation between the various departments is furnished by a very complete system of overhead trolleys. The foundry has a capacity of 35 tons daily and is one of the most completely equipped plants in the west. It was designed by John A. Lewis, general manager of the company. Gilbert Hunt is president and the plant will manufacture all lines of harvesting machinery.

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CLEANSING THE INDUSTRIAL SYSTEM.

The whole industrial system is undergoing a process of purification. In some portions the work is well under way; in others it is just beginning. The process is one of liquidation, passing from the financial end through commodities and winding up with labor. Business will emerge from the process in a sounder condition and better fortified for profitable activity.

The necessity for such cleansing comes from inflation. According to the severity of the trouble is the severity of the cleansing process and according to the thoroughness of the latter is the measure of recovery and improvement. It is the law of compensation—the greatest of all natural laws.

In the financial world there has been liquidation. There had been inflation in ideas of how much the circulating medium had increased, based on the fallacy that the increase in the production of gold meant an equal addition to the circulating medium, whereas it has been found that less than half the increase in gold production can be found in money. There had also been inflation in ideas as to what the increase in circulating medium could accomplish, sight being lost of the money withdrawn from circulation through the existence of widespread prosperity.

The liquidation in the financial world is being accomplished through the withdrawal of funds for new enterprises, culminating in difficulty in floating high class bonds, city of Boston bonds being unsaleable at 4 per cent and New York city having to pay 4½ per cent.

In the stock market there has been liquidation, resulting in lower prices for securities, the inevitable outcome of money being proved to be scarcer and worth more in interest return than had been assumed.

Now comes the liquidation in labor, the kind of liquidation most necessary, because ordinary manufacturing enterprises, such as are established, do not require to float bonds or other securities, and need not borrow undue sums of money if collections are fairly good.

The liquidation in labor is not so much a recovery from high prices for labor per hour or day as it is from inefficiency. Before the upward sweep in commodity prices of the past year or two, there was much complaint of the inefficiency of labor. These complaints have become less earnest not because labor has become more efficient, but because on account of the advance in commodity prices the inefficiency could be borne better. With the liquidation in the other branches of the chain of business, the liquidation in labor becomes a necessity. The complaint about inefficiency has become more earnest than ever.

The crest of inflation in labor, with high wages demanded and inefficient service rendered therefor, came at two places, at San Francisco and in the western mining camps. In San Francisco the remedy came first, being applied by man's device rather than the working out of natural laws, since the banks refused to finance contractors or builders who were paying more than certain rates of wages. In the mining camps, the remedy has been applied in several ways. The price of Lake copper has declined from 26 cents in March to 18 cents now and with an accumulation of a hundred million pounds or more of the metal, lessened activity in copper mining is at hand. In the Lake Superior ore region a strike was met in the safest economic way, by the importation of new men who will be trained into miners.

In the places where the inflation in labor broke out most virulently there has been liquidation, and development to a rational basis is in progress. In the great manufacturing industries in the east the work has hardly begun, but its commencement and full fruition are inevitable. It is not a time for a drastic revolution. Business had not become extremely unsound, calling for such thorough renovation as was necessary in the periods beginning with 1873 and 1893; a relatively mild reformation only is called for. Probably it can be accomplished with little of strikes and lockouts, or the throwing of large numbers of men out of employment. Rather it will be the gradual restoration to efficiency of the individual, as he sees that his services are less in request elsewhere and that his employer insists upon more results from the time upon his card.

The liquidation in labor will revivify the iron and steel industry. The iron and steel trade proper is usually regarded as a piece work proposition, but as a matter of fact it employs so large an amount of practically common labor that the common labor cost of the finished products of the steel industry is very important. The United States Steel Corporation, for instance, reported a total payroll in its last annual report of 202,457, but the coal and coke, iron ore and transportation properties accounted for but some 53,000. At its blast furnaces, steel works and rolling mills the corporation employed some 140,000 men or in the neighborhood of one man for a year for each 75 tons of steel products. The purely day labor rep-

resents between 100 and 150 tons per year per man.

In the industries consuming the products of the blast furnaces and steel works, such as foundries, fabricating shops and the metal working industries, labor is the most important element governing the cost of working up the material. In the consumption of the products of these shops, whether by railroads, the building trades, or what not, labor is equally or more important. Cheaper labor, in terms of actual results accomplished, will be the greatest possible boon to the iron and steel trade. When the liquidation in labor has run its course, the whole iron and steel industry will be on a stronger and more substantial basis.

THE FINANCIAL SOUNDNESS OF IRON ENTERPRISES.

In striking contrast with precedents is the financial soundness of iron and steel enterprises at the present time. With money extremely tight, collections very slow, and business generally halting, there is not the slightest breath of question raised as to the thoroughly solvent condition of the manufacturers of iron and steel. The failure of Milliken Bros. recently was but the exception which tested the rule. An analysis of the special conditions which attended and produced that failure showed how different were those conditions from those which surround other iron and steel making enterprises.

In the past it was not so. Furnaces and mills were continually failing. Even when the trade was apparently very prosperous there was no telling when a prominent concern might find itself in difficulties and have to ask its creditors to make arrangements.

The difference is not because the iron trade has passed through several years of extreme prosperity. Prosperity and large paper profits have frequently been the real, if not the immediate, cause of failures in the iron business. Profits beget confidence, then over assurance and frequently unwise expansion. The Pope automobile failure is an instance. No one could ask for a more rapidly increasing demand for any product than there has been for automobiles, and automobile buyers have not hesitated to pay fancy prices.

The change in conditions has been largely due to the rise of the public stock company. These companies cannot do things in the way of contracting obligations which a private firm or corporation can. Their borrowings must be more or less open. In a sense, their watering of stock may be unsound, but it is an unsoundness which is open to inspection. They are continually in the limelight.

The large interests have set a pace in the conduct of cash transactions which has been felt throughout the trade. All business in iron and steel is conducted on a much safer basis than it was years ago, and the present soundness of producers is evidence of the change.

THE IRREGULAR DEVELOPMENT OF RAILROADS.

Nothing illustrates more forcibly the hit or miss principle upon which American railroads have developed than the fact that the matter of increase in weight of rolling stock has just been brought into the subject of rail quality and rail section. It would appear from the discussions in conventions that it has remained for the rail makers to point out to the railroad interests that they have increased the weight and speed of locomotives to a greater extent than they have increased the weight of the rails upon which they run. A railroad is an entity, the parts of which should certainly be proportioned, yet it looks as if it were only now that the necessity of proportioning the locomotive to the rail, or the rail to the locomotive, is being carefully studied.

The railroad engineers balked so at any large increase in the rail section that it would appear that if they had known that such an increase would have been required by the rolling stock they have put upon the rails, they would not have introduced that rolling stock at all. An enormous increase in investment is required by any increase in the rail section, and it certainly is a question whether the game is worth the powder. All this, however, appears to be an after consideration. Development is continued independently along different lines until there is a clash, as at present, and then the inter-relations begin to be studied.

NET EARNINGS

Of Central Foundry Co. Show Falling Off in Year.

The eighth annual report of the Central Foundry Co. for the fiscal year ended June 30 shows a decrease in net earnings of $26,599. The report is as follows:

	1907.	1906.	1905.	1904.
Net earn'gs	$467,170	$493,769	$511,423	$467,504
Bond int..	231,780	231,780	231,780	231,780
Balance ..	235,390	261,989	279,643	235,724
Repairs, ren. repl & dep	235,390	261,989	279,643	235,724

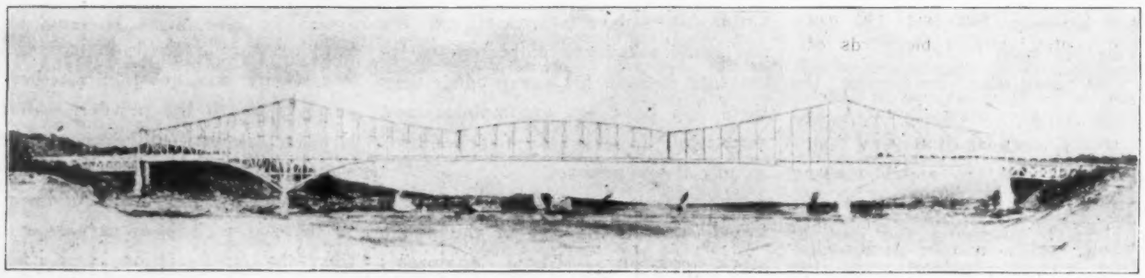
The company's general balance sheet shows an increase of assets in the year from $18,142,377 to $18,672,362, but a decrease in cash from $55,543 to $39,523. The net earnings of the Central Iron & Coal Co. and the Central Radiator Co. whose stock is owned by the Central Foundry Co., amount to $355,089, leaving a surplus of $227,160 after all charges. President August Heckscher, of the Central Foundry Co, says in part as follows:

During the year, owing to the high and fluctuating price of pig iron, more particularly from December to June, the earnings of the Central Iron & Coal Co. have been large and the earnings of the Central Foundry Co. have been impaired correspondingly. This shows the wisdom of the manping in the south a furnace plant of its own. Your company, through its ownership of the Central Iron & Coal Co., controls its own mines, coal properties and blast furnace, and is thus itself the producer of its principal raw material.

The earnings of the combined companies show a healthy increase over the previous year. The amount of business done in the way of tonnage also shows an increase of from 5 to 15 per cent.

At the annual meeting of the stockholders, held in Jersey City, the retiring board of directors was reelected with the exception of James Reid and James T. Boothroyd, who were succeeded by F. C. Furlow and F. A. Berthold.

A. F. Ford, J. B. Ferguson, B. L. Youngs and others have incorporated the Ford Pump & Engine Co., of Spokane for $100,000 for the purpose of manufacturing a line of pumps and engines.



QUEBEC BRIDGE AS IT WILL APPEAR WHEN COMPLETED.

QUEBEC BRIDGE FALLS

Causing a Loss of Eighty Lives—Cause Unknown.

The southern half of the bridge being erected over the St. Lawrence river, five miles from Quebec, fell on the afternoon of Aug. 29, causing the death of all but eight of the men engaged at work on it. The latest estimates give a total of 79 lives lost. The cause of the accident is unknown, but it is thought, in some quarters, to be the overloading of the incomplete span with structural materials. The accident occurred at 5:37 P. M., just as the men were quitting for the day. A train load of material had been run out on the bridge when the other end of the incomplete span was noticed to sag. It fell immediately, the remainder of the bridge to the south shore, a distance of about 800 feet, falling in successive sections, carrying away the tower and all steel work.

SOUTH CANTILEVER ARM FROM RIVER.

The Quebec Bridge.

The bridge was of the cantilever type and had a total length between abutments of 3,220 feet. It consisted of two deck truss, approach spans, each 210 feet long; two anchor spans, each 500 feet long; two cantilever arms, each 562½ feet long; one suspended span 675 feet long, the latter being the longest simple truss span ever built. The central span of the bridge from center to center of main piers was 1,800 feet, the longest in the world. The trusses were of the pin-connected type and had a width, center to center, of 67 feet. The depth varied from 97 feet at the portals to 315 feet over the main piers. The bridge had a clear headway over high tide of 150 feet for a width of 1,200 feet. The total weight of the steel to be used in its construction was estimated at 38,500 tons. The bridge was designed to carry two steam railroads and two electric railway tracks, two roadways and two foot tracks, all on the same level. The bridge was being erected by means of a traveler of the gantry type running outside the trusses on tracks at about the floor level and spanning the highest point of the bridge. This traveler fully rigged with all accessories weighed 1,000 tons.

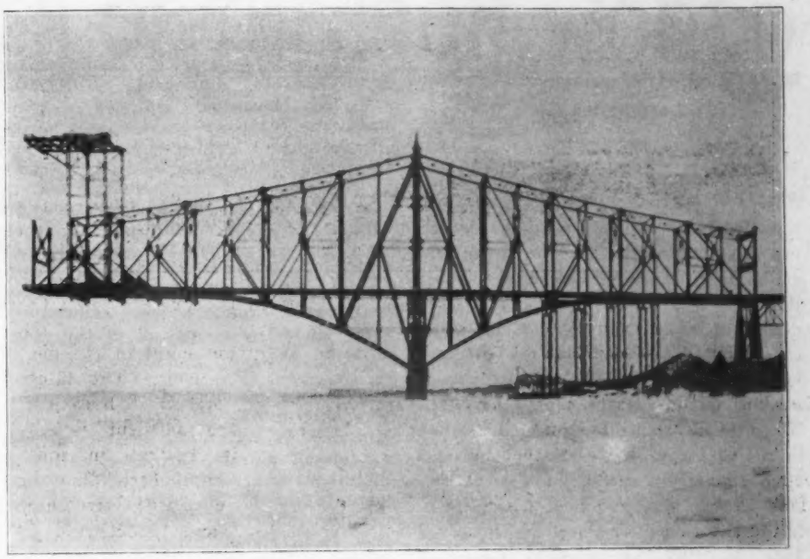
The main piers were of concrete faced with granite and sunk by pneumatic caissons 150 x 49 feet and 25 feet high. The tops of the piers measure 133 x 30 feet and they contain 35,000 cubic yards of masonry. The anchor piers are of concrete faced with granite and are 30 x 111 feet at the base and 55 feet high from bottom to anchorage. They are 24 x 105 feet at the coping and contain 14,400 cubic yards of masonry. The abutments are of concrete faced with

granite and are 80 feet wide, 40 feet deep and contain 4,000 cubic yards of masonry.

The two 210-foot deck truss approach spans were erected on falsework in 1902 and 1903. The erection of the main structure was begun in July, 1905. Owing to the severity of the climate, work is discontinued each year from the end of November to the first of April. Up to the end of November, 1905, six panels of the south anchor arm were erected, and during the season of 1905, the south anchor arm was completed and the south cantilever arm erected, a total weight of 10,423 tons.

All members of the anchor and cantilever arms were lifted from cars and run out under its overhang at the traveler and swung into place. The tension members of the bridge were composed of eyebars, which, with the exception of a few anchor bars and top chord bars were of a uniform width of 15 inches, ranging in thickness from 1⅜ to 2¼ inches, and in length up to 76 feet. The method of erection of these eyebars is shown in one of the accompanying illustrations. All bars constituting a single member are properly spaced and clamped in position and raised together in a bunch. The illustration herewith shows the raising of two top chord panels of 23 eyebars each, the total weight being 160 tons. These were placed in position at a considerable angle from the horizontal at an altitude of 300 feet above the river.

The engineering work was done in the drafting rooms of the Phoenix Bridge Co., Phoenixville, Pa., which had the contract for the ironwork and detailed the structure. The number of field rivets was cut down to a minimum. However, 550,000 remained to be driven, ranging from ⅝ to 1 inch diameter and up to 7 inches in length. The pin connections in the anchor and cantilever arms ranged from 9 to 24 inches diameter and up to ten feet long.



South Anchor and Cantilever Arms Complete.

AMONG THE INDUSTRIES OF INDIANA.

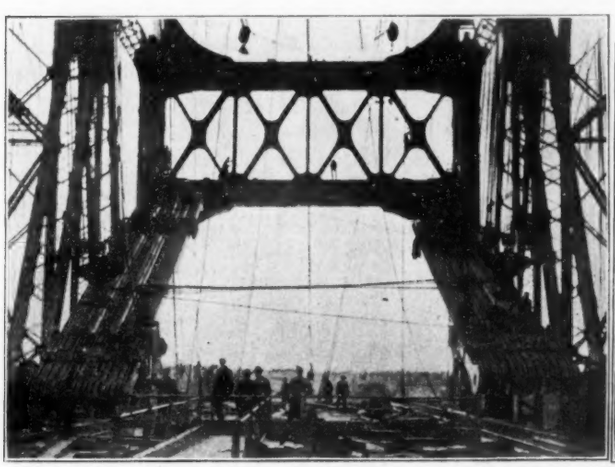
(Special Correspondence.)

Indianapolis, Sept. 3—Repairs and additions are being completed at the plant of the National Malleable Iron Casting Co., Indianapolis. The work being done will reach $13,200. Two brick factory buildings costing $8,000 and $4,000 respectively are being erected while a new roof is being put on a third building at a cost of $1,200.

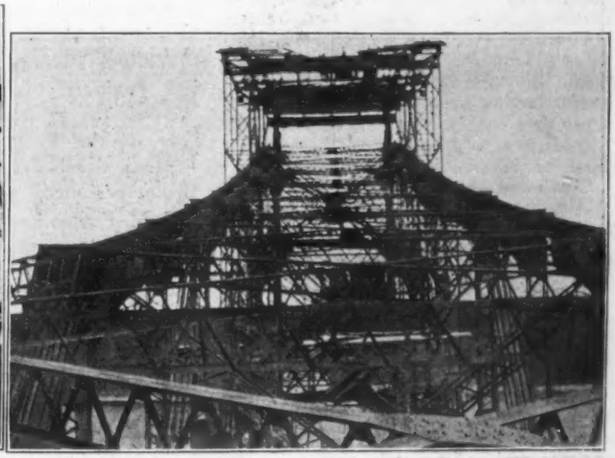
An effort will be made Oct. 1 to sell the plant of the defunct Dorner Truck Co., Logansport. A few days ago the plant was offered for sale but the bid received was less than one-half of its appraised value of $11,600, while the court ordered it sold at two-thirds of the appraised value. The Logan Truck Co., of this city was recently organized to bid in the plant, but the bid of C. B. Ensign, representing the company, was too low.

The Newcastle Iron & Brass Bedstead Co., Newcastle, is being moved to Muncie and Butler, Pa., following a deal in which the Pittsburg-Hickson Co. acquired control.

The E. H. Manning Transmission Co. has been incorporated and will establish a factory at Elkhart. Power transmissions and changeable gearing will be manufactured. The company has been organized with $100,000, with Ebenezer H. Manning, Harry H. Bridgewater, William E. Wider and Ernest A. Skinner as the principal stock holders and directors.



Raising Top Chord Eyebars.



View over Top of South Anchor Arm.

LARGE INCREASE

Made in Gross Earnings of American Locomotive Co.

An increase in the gross earnings of $5,957,610 over the preceding year was recorded by the operations of the American Locomotive Co. for the fiscal year ended June 30, last. The large increase in the operating expenses of $6,659,010, due to the higher cost of labor, material, etc., reduced the gain of net earnings in the year to $303,600. Notwithstanding this fact the company paid out $937,500 more to common stockholders than in the previous year. The final surplus from the year's operations was $1,358,207, making the total fund now $7,963,580. The general balance sheet as of June 30, 1907, shows total assets of $74,501,672, against $70,717,916 in 1906 and $63,910,823 in 1905. The report of earnings, as it compares with the previous year, is as follows:

	1907.	1906.
Gross earnings	$49,515,486	$42,547,876
Operating expenses	42,744,381	36,085,371
Net earnings	$6,771,105	$6,462,505
Charges, etc.	412,898	281,812
Surplus	$6,358,207	$6,180,693
Preferred dividends	1,750,000	1,750,000
Balance	$4,608,207	$4,430,693
†Add to property		1,001,565
Balance	$4,608,207	$3,429,128
Improvement and betterment fund	2,000,000	2,000,000
Investment in Montreal Works		
Surplus	$2,608,207	$1,429,128
Dividend on common	1,250,000	312,500
Surplus	$1,358,207	$1,116,628

In his report to the stockholders president W. H. Marshall says in part:

"In the fiscal year just closed the company has secured the largest output and transacted the heaviest volume of business in its history. Moreover, its capacity for handling future business has been substantially increased by the erection of new shop buildings, power plants, machinery, equipment, etc., principally at Schenectady, Dunkirk, Richmond and Montreal. To still further increase the capacity and efficiency of the plants there has again been created an extraordinary additions and betterment fund of $2,000,000.

"Included in expenses are all direct and indirect charges against manufacturing, maintenance and adimnistration; also depreciation upon all property and equipment, and the adjustment of the book values of the material and stock on hand, the latter being confirmed by physical inventories taken June 30, 1907.

"In addition to liberal disbursements, for the upkeep and replacement of the plants, included in expenses, there has been expended for improvements and additional property the sum of $1,692,858, which has been paid for out of the fund of $2,000,000 created June 30, 1906.

"During the year the outstanding 'bills payable,' amounting to $3,300,000, have been paid off and in their stead the company has issued a series of short-term gold coupon notes aggregating $5,000,000, bearing interest at the rate of 5 per cent and maturing annually in sums of $1,000,000, on October 1, from 1907 to 1911; thus providing an additional cash capital of $1,700,000, which was urgently needed, notwithstanding the large increase in working capital which has accumulated since the formation of the company in 1901.

"In April, 1907, the structural steel department established at Montreal was sold to the Structural Steel Co., Ltd. As a necessary feature of the agreement of sale, the structural shop buildings and equipment at Montreal were leased to the new company for the term of two years, with an option for one additional year. The Montreal company will, therefore, devote its attention hereafter exclusively to the business of producing and selling locomotives, steam shovels and rotary snow plows, for all of which the rapid development of transportation and industrial enterprises in Canada offers a field of exceptional promise."

PERSONALS.

Judge E. H. Gary, chairman of the board of directors of the United States Steel Corporation, sailed for home from a European trip Sept. 4.

A. F. Keller, has resigned his position as chief engineer of the Mesta Machine Co., Pittsburg, to accept a position with the United States Steel Corporation at its new Gary plant.

Thomas Mitchell has resigned his position as superintendent of the Chester plant of the American Steel Foundries to become connected with the Reliance Steel Foundry Co., Delawanna, N. J.

Major Hugh W. Adams, of Hugh W. Adams & Son, New York, iron merchants, has returned from a four months' trip to Europe taken for the benefit of his health.

William Melhorn, formerly mechanical engineer of the Pencoyd Iron Works, has been made general manager of the Pottsville works of the Eastern Steel Co., succeeding A. H. Beale, resigned.

H. M. Kearns has been appointed as its special government representative by the Pennsylvania Automatic Vise & Tool Co., Pittsburg, to look after its extensive vise business among the several branches of the United States government.

W. H. McFadden, of Mackintosh, Hemphill & Co., Pittsburg, sailed from Philadelphia on Saturday of last week for a three months' trip to Europe. Mr. McFadden has been in ill health since early spring and he will stay abroad until he recuperates.

J. P. Johnston has resigned his position as sales manager of the water tube boiler department of the Atlas Engine Works, Indianapolis. Mr. Johnston's address is now care of the Engineers' Club, New York, or his summer home, Stony Brook, L. I.

J. Gray Buchanan has succeeded to the sole management of the firm of William Jacks & Co., London, metal merchants, following the death of William Jacks Sr., which occurred recently. Mr. Buchanan will be assisted as heretofore by Stewart Barry and R. Russell Walker, who have been in the service of the company for many years.

OBITUARIES.

Edward R. Coffin, vice president of the Electric Securities Corporation and a director in many electrical concerns, died Sept. 2 in a hospital at Omaha, Neb. He was a son of Charles A. Coffin, president of the General Electric Co.

Mrs. Margaret Truesdale Kennedy died at her home in Lowellville, O., last week at the age of 83 years. Mrs. Kennedy was the mother of six children, including Hugh Kennedy, vice president of the Seneca Iron & Steel Co.; Julian Kennedy, of Pittsburg, and Congressman James Kennedy, of Ohio.

Henry T. Townsend, president of the Logan Iron & Steel Co., whose works are at Lewistown, Pa., died at Bryn Mawr Sept. 1, aged 56. He was the son of Edward L. Townsend, at one time president of the Cambria Iron Co., and was a director in the Southwark Foundry & Machine Co. Mr. Townsend had been president of the Logan Co. for 20 years.

Ready For Sheet Orders.—The Seneca Iron & Steel Co., Buffalo, is now in a position to quote prices and take contracts on black and galvanized sheets, open-hearth and Bessemer stock, for delivery in September and the fourth quarter. As it has a liberal tonnage to place and can insure prompt shipment, inquiries from the trade are invited. The local offices of the company are located in the Erie county bank building, Buffalo. The officers of the company are: James S. Paterson, president; Hugh Kennedy, vice president; Alex Paterson, general manager and treasurer; H. M. Van Horn, secretary; S. B. E. McVay, sales manager.

EMINENT MEN OF THE IRON WORLD

V.--J. J. SPEARMAN.

By W. B. Robinson.

John J. Spearman, of Sharon, Pa., is probably the oldest man living who, during his entire career, has been identified with the manufacture of pig iron in the United States. If his life is spared until Dec. 27 of this year, he will be 83 years old. The years have rested lightly on his shoulders, and he is still active, both physically and mentally, and daily performs the duties of president of the First National Bank of his home city.

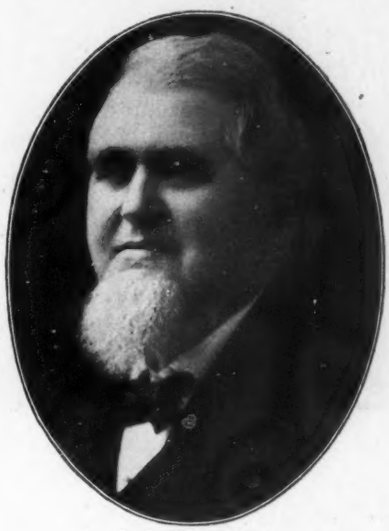
"I am not a rich man; I am not a millionaire; I am not worth even half a million, but have accumulated enough to live upon for the remainder of my life, if I take care of it. I take the world easy and enjoy life pretty well", said Mr. Spearman. "The doctors say I may live 20 years. I would like to live that period, if I could enjoy life as I do at the present time, but if it should be my lot to become ill and suffer, I would anxiously await the end. I have no fear of the hereafter and am ready when the time comes."

This has been the philosophy of Mr. Spearman throughout his more than 70 years connection with one of the country's greatest industries. He has been identified with the manufacture of pig iron from the establishment of the first cold blast charcoal furnaces in Eastern Pennsylvania, and the westward movement of the iron trade, located in the Shenango Valley, Mercer County, Pa., in 1847. His active connection with the manufacture of pig iron ceased with the sale of his furnace at Sharpsville, operated under the name of the Spearman Iron Co., to the Shenango Furnace Co., one of the W. P. Snyder interests of Pittsburg, devoting his time since then to his bank and to the enjoyment of the well earned rest after his busy career.

Primitive and Modern Practice.

Speaking of primitive practice and the changes which he encountered from the time he was a boy around the old cold blast charcoal furnaces in Pennsylvania, until the time opportunity reached out from west of the Allegheny mountains, through his experience with the old Sharon, Mazeppa, Sharpsville, and Wheatland furnaces, during the time he was at the head of the co-partnership bearing his name, and finally down to the modern practice of the present day, Mr. Spearman says a record would read more like a fairy tale than a recital of the progress of the great industry from its infancy to the stage at which he now looks upon it from his retirement.

From the wooden cylinder blowing engine and the leather bellows operated by water power, he now sees the immense steam blowing engine, or gas-driven blowing engine. From the production of four to four and a half tons per day of the furnaces with



J. J. Spearman.

which he was first connected, he can now see modern blast furnaces producing in two and one-half days as much pig iron as his old furnaces turned out in a year, if they had worked 365 days. From the old stock bridge and oak strip baskets from which material was dumped into the open top of the old furnaces, he can now see the modern electrically-driven skip hoists and the pig metal molding machines take the place of his little sand bed, and the long line of freight cars each with a capacity of 50 tons, or the 50-ton hot metal car running to Bessemer converters, or open-hearth mixers, take the place of the horse and cart which he drove, conveying Dr. Shoenberger's cold blast charcoal iron from the Hopewell furnace to the run out fires in Bedford county, Pa., in 1836.

Early Career.

Mr. Spearman was born at McKee's Gap, eight miles from Hollidaysburg, Bedford Co., Pa., Dec. 27, 1824. His father was a miller, and the Spearman homestead later became the site of Dr. Peter Schoenberger's Martha furnace.

Dr. Peter Schoenberger was the first great iron master of the country, and a large owner of mineral lands, coal properties and timber lands in Bedford and Huntington counties. When Spearman was 11 or 12 years of age, he went to work, his first occupation being the manipulation of a leather blacksmith bellows which forced air into the shaft to the working miners at the Hopewell ore mine, Bedford county, Pa. This Hopewell furnace, according to the recollection of Mr. Spearman, although he did not go to work for the company until 1836, was in active operation as early as 1794, one of the journals of the company showing contracts for iron in that year, although the furnace was built probably seven or eight years before that date. This furnace, which was very primitive, was known as a quarter stack, about 30 to 35 feet high, with a seven or eight-foot bosh, built against the hillside, with the bridge-house extending to the top of the furnace. It had but one tuyere, was built of block stone, and, in lieu of the present system of skip hoists and charging apparatus, was charged by baskets. The proper proportions of charcoal, limestone and native ores were thrown into the open top of the furnace, and no scales were used to secure exact mixtures, but instead, a series of boxes were used as standards.

The blowing engines, operated by water-power, were of the simplest type, with wooden connecting rods, wooden blowing cylinders with leather valves. No efforts were made to heat the blast; charcoal was used as fuel, and the production of pig iron was from 4 to 4½ tons per day. Casts were made twice daily and taken from the furnace in the usual way, the major portion of it being used for refining in the knobbling

furnaces, but as a side line, molders were employed to cast stove plates, kettles, sad irons and a large variety of other household articles, taking their metal in ladles directly from the pouring troughs of the furnace.

Mr. Spearman delights in telling of his early experiences at this furnace, and details of operation, methods of handling the material, and the view taken of the iron business at that time is still vividly impressed upon his memory. Educational advantages were very few. He attended school three months during the winter, and worked about the mines and furnace during the summer.

First Employment.

From bellows boy at the mines, he graduated to the position of driver of a horse and cart—this during the summer months—hauling lime-stone three miles to the furnace. This, it may readily be understood, was not a difficult task, as less than 300 pounds of lime-stone were sufficient for one day's supply. After delivering the cartload of limestone, he loaded pig iron into his cart and hauled it half a mile to the refinery, or run out fire, this being a process between the blast furnace and knobbling fire, where the metal was manufactured into bar iron. Spearman was not strong enough to handle the heavy pigs of metal, and loaded them into his cart by means of a plank runway and rollers.

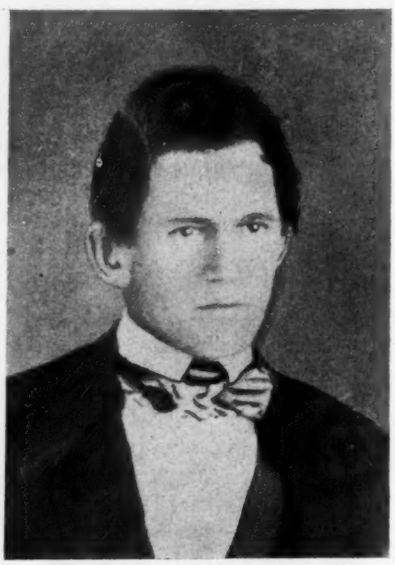
As an illustration of his vivid recollection of early times, Mr. Spearman enjoys telling anecdotes about himself, and one refers to his practice of defining a day's work. The Hopewell furnace was located on the Racetown branch of the Juniata river, which empties into this stream just below Huntington. When working at the ore mines, Mr. Spearman says the deposit was on the western side of the river, and that the shadow of the sun going down behind these mountains reflected on the eastern hill, and as the shadow crept to the top and disappeared, tools were thrown down and work for the day suspended.

Education.

When Spearman was 15 years old, still attending school during the winter months, he left the furnace and entered a general country store which handled all sorts of merchandise, dress goods, feed, household commodities and even whiskey. "I was able to read and write, and when I entered the store, my teacher said that, inasmuch as I had decided upon a business career, I should have some knowledge of business practice, and he undertook to explain the principle of interest and financial transactions to me," said Mr. Spearman.

He spent two years in the store, and then sought employment with Dr. Peter Schoenberger at his Sarah furnace in Bedford county in the fall of 1841, and was what was known at that time as a "molasses clerk", the name implying nothing, as the duties consisted of measuring out feed for the horses and doing all the menial chores about the plant.

In the spring of 1842 he was employed by the Rebecca furnace in Huntingdon county as bookkeeper and head clerk, remaining until 1845. He was then transferred by Dr. Schoenberger to the Maria Forges, Bedford county, now a part of Blair county on the Roaring Springs river, eight miles from Hollidaysburg, as assistant manager of the works. Bedford, Huntingdon and Center counties were then the iron centers of Pennsylvania, and for that matter, the United States, and according to



J. J. Spearman When He Went to Sharon in 1847.

Mr. Spearman's recollection there were 20 blast furnaces in that district.

Career of Dr. Schoenberger.

Dr. Schoenberger, before engaging in the iron business, was one of the leading physicians of eastern Pennsylvania, and had a wide reputation in his profession. He had very little capital, but saw a bright future in the iron business, and started in a very small way, having only a knobbling fire and a cataline forge. Without sufficient capital to build a furnace of his own for the production of pig iron, he bought his material from the Huntingdon furnace in small lots, paying for it in refined iron bars made in his knobbling fire and forge, and what profit he made came from the sale of surplus blooms to the general trade. Little by little his business grew, and he built furnaces and iron mills, adding them to his timber holdings, and it was not long before he was the leading factor in the business in that part of the country. Most of his time was spent in traveling by private carriage from one furnace to another, superintending operations and selling his product as best he could.

At that time there was no railroad within many miles of his furnaces, and the iron from the Hopewell furnace, at flood stage of the Racetown branch of the Juniata river, was loaded in barges or arks and floated down to the canal at Huntingdon and towed by canal to Hollidaysburg and then transferred to the railroad running over the Allegheny mountains to Johnstown, Pa., where it was re-shipped by canal to Pittsburg. He started with practically no capital and when he died in 1854, had accumulated a large fortune. He left three sons, George K., John H. and Edward, the two former before the death of their father having started an iron mill in the Pittsburg district, George K. representing the concern as selling agent in Cincinnati, while John H. remained in Pittsburg in charge of operations. The father and third son, Edward, took no active part in the operations of the Pittsburg mill.

Early Operations in Pennsylvania.

Mr. Spearman says Lebanon, Lancaster and Franklin counties each had several furnaces, some of which were built as early as those owned by Dr. Shoenberger. The Cornwall mine, opened in 1740 and to this day the only really large body of ore in Pennsylvania then became a great producer. The Grubbs were the leading factors in Lancaster county; Dr. Shoenberger in Bedford and Huntingdon counties, the Paxtons and Eges in Franklin county, the Curtins, Gen. Miles and others in Center county. In 1840, with President Van Buren in the White House, business began to decline and several of the furnaces ceased operations, but in 1842 the Whig congress passed a tariff which led to the building of more furnaces, and started a movement westward into Cambria, Clarion, Venango and Mercer counties over the Allegheny mountains. Dr. Shoenberger, with David Agnew, George S. King and Joseph Bell, built the Sharon furnace at Sharon, Mercer county, Pa. Mr. Agnew was a graduate of the doctor's Maria forges, and had been postmaster in Wheeling, Va., under President Tyler.

In 1847, Dr. Shoenberger bought the interest of Joseph Bell, who had become manager of the furnace which went into blast in the latter part of 1846. John J. Spearman was brought from Huntington county to Sharon to succeed Mr.

Bell on Jan. 31, 1847. At this time Mr. Spearman was 23 years old, and as assistant manager of the Maria Forges was paid $200 a year and his board, and went to Sharon as manager of the new furnace at $300 and board per year. The trip to Sharon, the expenses of which were borne personally by Mr. Spearman, was by stage from Hollidaysburg, which place he left at 8:00 o'clock one Wednesday evening, across the Allegheny mountains at what is known as Laurel Ridge, and arrived in Pittsburg Friday morning. He spent the day in that city and then took the stage to Butler, Pa., thence to Mercer and finally to Sharon. The actual traveling consumed 66 hours, the same trip now being possible, with modern transportation facilities, in eight hours.

THE SPEARMAN RESIDENCE AT SHARON, PA.

Westward Movement of the Iron Trade.

Referring to the movement of the iron business west of the Alleghenies, Mr. Spearman says that under the influence of the tariff of 1842, George S. King, of Johnstown, and the Shyrocks, built the Cambria furnace near Johnstown, Pa., calling the new enterprise the Cambria Iron Co. and within a short time it had three or four furnaces in that locality. Dr. Shoenberger became interested in them, and about 1850 conceived the idea of erecting a mill for the manufacture of iron rails at Johnstown. He capitalized the company heavily, putting the furnaces in as part of the capital. The operation was not successful, and the plant was taken over by Wood, Morrell & Co., of Philadelphia. Later, with the approach of the civil war, the increased demand for iron rails, as well as for other iron products, Wood, Morrell & Co., as lessors of the Cambria Iron Co. prospered and amassed a large fortune. The affairs were later so manipulated that they again went under the control of the Cambria Iron Co., although Mr. Morrell was retained as manager.

When Mr. Spearman arrived at Sharon, the Sharon furnace had been in and out of blast four times in a year. It was of the old cold blast type, badly equipped, and had a capacity of about four tons a day, or 28 tons per week. It used block coal as fuel and the optimistic boast of its operators was that some time in the future its capacity would be 40 tons per week. The story that came from England to the effect that some furnaces over there were making 80 tons per week was ridiculed. Spearman saw the furnace was badly in need of repairs, and having had some little experience in the business, fixed things up to suit his own views and started the furnace.

Developments in Sharon.

The blast furnace business in the vicinity of Sharon, with the natural advantages discovered in the way of large coal deposits, and an ample supply of native ores, increased very rapidly, and the light of 14 blast furnaces could be seen from the top of the Mercer county court house.

About this time the Democrats came into power and passed the tariff of 1846. Soon the iron business began to wane, and in 1852 the only furnaces of the 14 in blast six years before were the Clay furnaces, eight miles north of Sharon, and the Middlesex furnaces, both owned by Erie operators with foundry interests which consumed the product of the furnaces. During the business stagnation in the spring of 1852, Allegheny valley charcoal iron was sold at $52 per ton at Pittsburg, and Sharon iron at $20 delivered at the same place. The Sharon iron was made of native silicious ores, containing 33 to 40 per cent iron, and was a silver gray grade, good for castings not requiring great strength.

Mr. Spearman desired a furnace of his own, and as the Mazeppa stack was for sale, having been acquired by the Fabers of Pittsburg, and taken in judgment on account of debt incurred for machinery, he purchased the plant in the fall of 1852. He remained with Dr. Shoenberger until the following May, but, in the meantime, operated his own furnace. In the meantime the iron trade improved and Allegheny valley charcoal iron sold at $50, Pittsburg, Mercer county iron at $40. In August of that year, the Sharon furnace sold 50 tons of Mercer county iron at $19 delivered in New Castle, on nine months' credit, and three months later the same grade sold at $40, Pittsburg, this jump in prices being due to a scarcity of iron brought about by the suspension of operations, on account of the unfavorable tariff. Spearman, with the Mazeppa furnace, came in at an opportune time, and sold his iron at the high price, but on account of a reservation made in his contract, permitting him to sell 200 tons of his yearly output to an interest other than that taking the bulk of his iron, he lost $8,000 and was temporarily compelled to quit business on account of lack of capital. In 1859 the iron business was again demoralized, and with the exception of Clay furnaces, practically all stacks in that district were out of commission.

Lake Superior Ore.

Much has been said, and several controversies have arisen regarding the first successful use of Lake Superior iron ore in Ohio and Pennsylvania, but few of those connected with the business in those early days are still alive. The Sharpsville furnace, at the time Lake Superior ore was introduced into the Shenango valley, was owned by David and J. F. Agnew. The Clay furnace was owned by the Sharon Iron Co., of which General J. P. Curtis was president and Frank Allen manager. It is conceded that the first ore used in the valley was at the Sharpsville furnace, and at that time John J. Spearman was manager of this plant. The controversy does not relate so much as to which furnace, Clay or Sharpsville,

first used the ore, as it does to which used it successfully. Frank Allen of Clay furnace admits the contention of Messrs. Agnew that the first ore was put through the Sharpsville furnace, but says that it was mixed in proportions of ¼ Lake Superior to ¾ native ores. David Agnew, in records left by him, claims the distinction of having been the first to work this ore successfully, but in this he is emphatically contradicted by Mr. Allen of the Clay furnace, whose contention was that a mixture with the native ores, and the comparatively small portion of Lake Superior ore used, could not be considered a successful test. He maintained that this ore was never successfully worked in a blast furnace at Sharpsville, Clay furnace or elsewhere in the Shenango valley, until it was done at Clay furnace in the fall of 1856, after the stack had been rebuilt and six feet added to its height.

Mr. Spearman, as furnace manager of the Sharpsville furnace, states that in his experience, the first ore worked in the Shenango valley was at the old Sharpsville furnace, but that only a small quantity was used in the mixture with native ores, thus maintaining Mr. Allen's contention that the first Lake Superior ore worked alone was at the Clay furnace. It is admitted that Lake Superior ore used alone in the first practice was far from successful, it being hard on the furnaces until they were rebuilt to suit the peculiar requirements of this high grade ore. Speaking of the introduction of this ore in the Shenango valley, Mr. Spearman says that in 1855 the Cleveland Iron Mining Co. and the Jackson Iron Co. both of Cleveland, commenced shipments to lower lake ports and experiments were made by them in the Mercer valley district and in the vicinity of Sharon, New Castle and Sharpsville. Jacob Reese, recently deceased, was, according to Mr. Spearman, the first to try the experiment in the New Castle district where Lake Superior ores were used as "fetler," or "bull dog," and lining for knobbling furnaces, largely replacing the use of mill cinder and Lake Champlain ores.

Early Ore Shipments.

The ore was shipped from the mines, on Lake Superior to Sault Ste. Marie, and as there was at that time no canal around the rapids it was portaged to the foot of the rapids and then reloaded and taken to Erie, Pa., thence by canal to Sharon. Later Gen. James Pierce became owner of the Sharpsville furnace which, on the authority of Mr. Spearman, he had secured and taken over on account of a debt of the previous owners. General Pierce also owned considerable coal property which would not coke, and in addition to this was not looked upon with favor for other uses. Experiment disclosed, however, that it did not contain as much bitchment as other coals, and when heated would not become plastic, this making possible its adoption and use in a blast furnace without coking. This coal was similar in grade to that being used by the Clay furnace.

General Pierce, finding himself with the old furnace on his hands as one proposition, and the objectionable coal as another, decided to combine the two by starting the furnace and using the coal as fuel. The plan was a great success. Spearman was manager of the furnace. The Jackson Iron Co. owned ore mines near Marquette in the Lake Superior district, and President Sam'l Kimball of the iron company made a proposition to the owners of the Sharpsville furnace whereby they would work it on shares, Kimball to furnish the iron ore and receive a proportion of the pig iron, Pierce to operate the furnace and also receive a share. General Pierce had a partner, a Mr. Fish, whom he bought out giving in exchange for Mr. Fish's half interest in the furnace considerable vessel property on the lakes. Before this time, the Jackson Iron Co. endeavoring to produce steel direct from iron ore, secured control of both the Sharon Iron Co. and the Clay furnace, and started the furnace in on Lake Superior ore and worked it successfully in 1857 and 1858. President Kimball of the Jackson Iron Co. in his agreement with General Pierce of the Sharpsville furnace furnished all the ore the Sharpsville furnace required for a period of five years, bringing it in by canal from Erie to Sharpsville, and in payment his proportion of the iron produced by the furnace mentioned before, was to be one-half of the entire production. Mr. Spearman, who was manager of the furnace, says that in his experience the Lake Superior ore worked out easier than the native ores, despite the supposition of many operators who believed and contended that the richer Lake Superior ores, running as they did from 20 to 35 per cent higher in metallic iron than the native Pennsylvania ores, were too rich, and he says that at the time the change was made it attracted no particular attention.

Operations at Wheatland.

Becoming dissatisfied with his arrangement at the Sharpsville furnace, inasmuch as he was working on a salary of $1,500 a year, Spearman negotiated with James Wood & Sons and left Sharpsville in 1862. He took up his residence at Wheatland, Pa., 2½ miles distant, and made a contract with Capt. James Wood whereby they were to erect a furnace at Wheatland and Mr. Spearman in return for his services was to be paid on a tonnage basis, he to receive $2.75 for every ton of iron produced and loaded on canal boats, Captain Wood to furnish all material. It was at this time, in 1862, that Captain Wood, after having looked over the situation in the vicinity of Pittsburg, decided that Pittsburg was not the place for blast furnaces and decided to locate at Wheatland. Prior to 1862, the only blast furnace at Pittsburg was built by Graff, Bennett & Co. and is now the Clinton furnace of the Clinton Iron & Steel Co. In 1862 Captain Wood had one furnace erected at Wheatland and it went in blast in 1863, another was built in 1864 and two more were erected during the succeeding year. These furnaces are now out of existence. Within a year after his association with Captain Wood, Mr. Spearman was taken in as a partner, but, when Captain Wood died, his sons Charles and Theodore began to talk expansion and contemplated the erection of a mill for the manufacture of iron rails. On account of ill health and other reasons, Mr. Spearman about this time decided to retire, and in November, 1870, sold out his interest and left the company.

Organization of Spearman Iron Co.

One year later, or in the fall of 1871, Mr. Spearman secured the co-operation of Joseph Forker, John Phillips, B. H. Henderson and Walter Pierce, son of the general, and formed a co-partnership known as the Spearman Iron Co. This company erected two small furnaces at Sharpsville, started construction in May, 1872, and placed the first in operation in January, 1873. These furnaces were 50 feet high and had a 12-foot bosh. Their operation was not very satisfactory, one of the drawbacks experienced being due to the use of the old iron stoves, which were torn down and replaced by brick-lined stoves of the Whitwell pattern. Both of these furnaces were later dismantled, and a new furnace with a capacity of 300 tons per day, 75 feet high and with a 17-foot bosh, was erected.

(Continued on page 402.)

THE MINNEAPOLIS STEEL AND MACHINERY CO.

A Factory for the Manufacture of Corliss and Gas Engines.

Minnesota is in but the infancy of its growth as a manufacturing state yet in the five years since the spring of 1902, the Minneapolis Steel & Machinery Co. has developed into the largest engine building and structural steel building plant of the northwest. Particularly has it grown in supplying the mining, milling and power plants of the west with their equipment. The Twin City Corliss engine, the Muenzel gas engine and suction gas producer are manufactured here. Steel elevators and storage tanks, bridges for railroads and highways, structural steel buildings for all purposes, and power transmitting machinery are all built in the various departments of this industry which already occupies property to the extent of 19 acres. Two general features the representative of THE IRON TRADE REVIEW found worthy of particular mention—the rapidity of growth of this plant and the unusually careful and necessarily expensive methods in the various departments for turning out a product free from flaws and accurately machined. The rapidity of growth is attested by the fact that not only has the entire business been built to its present proportions in five years but also by the adding on in the last year of two separate additions to the machine shop and foundry, each independently made necessary by developments during the year. Of the careful methods in practice at the Minneapolis Steel & Machinery Co. plant evidences will be found in the following descriptions.

FIG. 1.—INTERIOR OF FOUNDRY, MINNEAPOLIS STEEL & MACHINERY CO.

The general layout of the plant is shown in Fig. 2 and it will be seen that the pattern shop, pattern storage, foundry and machine shop are arranged in relation to each other logically with reference to progression from one department to the other. The structural steel shops are grouped around a central stock yard and warehouse with the finishing department adjacent to the shipping yard. The buildings are of uniform type with steel framework, three bays wide with a monitor roof over the middle bay. The office building provides executive, clerical and engineering offices for all departments but in the accomplishment is taxed to the utmost and probably will be the next field for enlargement.

Pattern Shop.

The pattern shop is not different

from the ordinary one. It occupies two floors of the building, most of the tools being on the ground floor while on the upper floor the patterns and templates requiring more room for laying out, are put together. One pattern storage vault adjoins the pattern shop and another separate building for the same purpose stands in the rear of the foundry.

Foundry.

The foundry of which an interior view is shown in Fig. 1 is 111 feet wide by 334 feet long with a clear height under the cranes of 30 feet. In the main bay are two 20-ton Pawling & Harnischfeger cranes and in the east bay one of 10 tons and one of 5 tons capacity and built by the same firm. In the bay on the opposite side are the core rooms, drying ovens, and the cupolas. The cupolas are centrally located, built by the Whiting Foundry Equipment Co. and are 52 and 66 inches diameter, respectively. They are each supplied with air from a motor-driven No. 8 Sturtevant blower. The daily pour in the foundry amounts to about 50,000 pounds of metal.

Near the cupola and directly above the core ovens is a platform, accessible by means of the large central crane, where the ladles are stored when not in use, thus saving considerable floor space and providing a definite place for them. The ladles are of various sizes ranging from 500 pounds to twenty tons. In addition to the traveling cranes there are installed, where necessary, swinging jib cranes, attached to the columns. These cranes have a horizontal runway from which an air hoist is suspended, thus covering the entire area within a certain radius about the column.

The smaller engine parts and machinery are cast in the side bay and the engine beds, cylinders and fly wheels in the middle bay. The engine bed molds are made in permanent pits in the floor. Where the guide section is separate from the rest of the bed as it is in some of the types, it is cast in a flask as are also the cylinders. For heavy duty engines the beds and cylinders are cast of semi-steel as are the crosshead shoes also, the steel scrap being added in the cupola, which necessitates hotter metal in pouring.

Just outside the foundry in a row on the same side as the cupolas are the various coke, lime, pig iron and sand storage bins arranged to provide for the most convenient supplying of the foundry requirements. On the op-

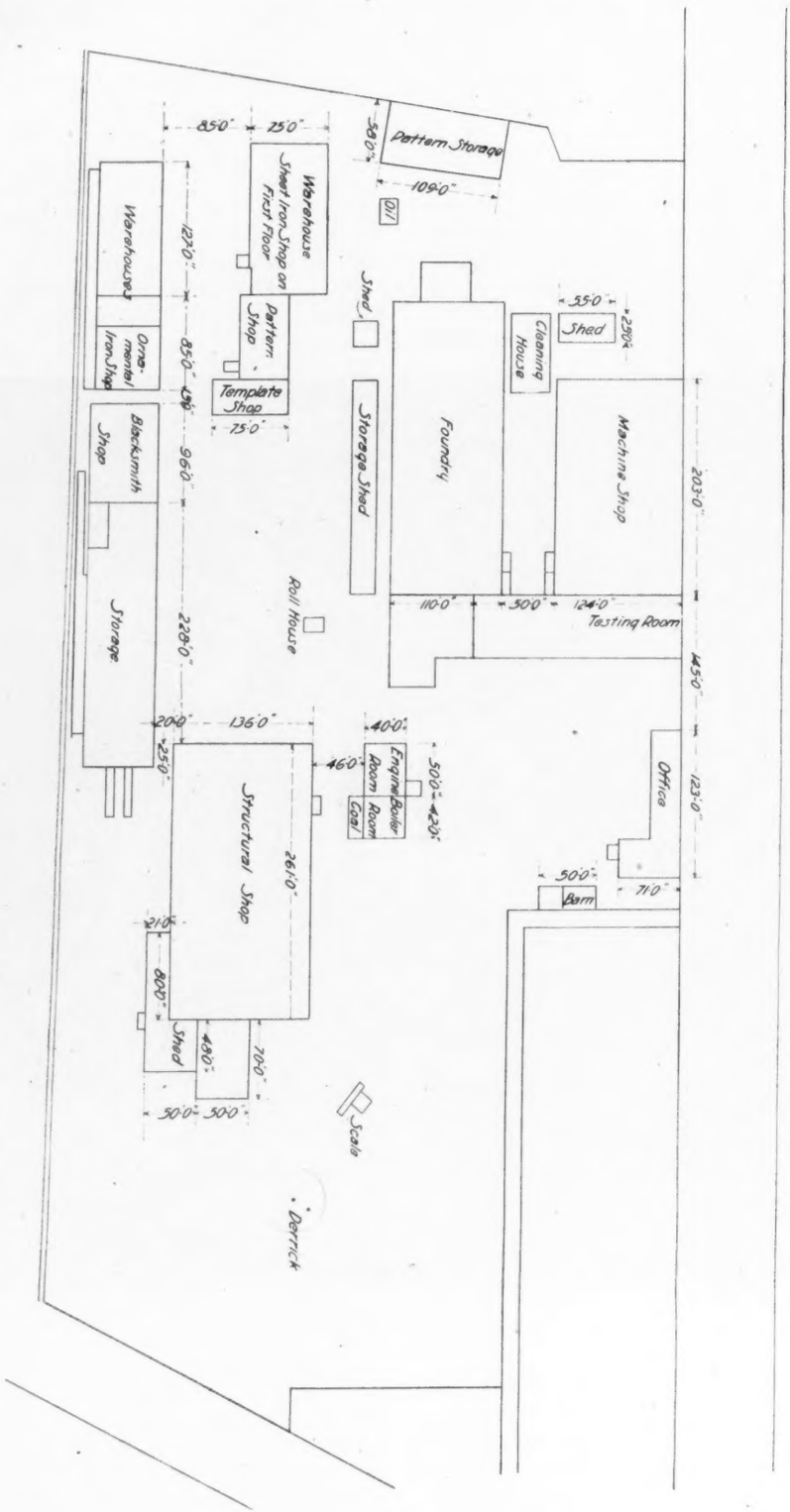


FIG. 2.—GROUND PLAN OF WORKS OF MINNEAPOLIS STEEL & MACHINERY CO.

posite side, the cleaning shed adjoins the foundry near one end, being located between the foundry and the storage room for stocking the unmachined parts awaiting demand from the machine shop. This stock room is immediately in the rear of the machine shop, so that each movement of the castings from one department to the other is constantly toward the finished product.

Machine Shop.

Up to a short time ago when the new addition was put on the end of the machine shop and a clear floor for erecting and testing purposes was provided, that work was crowded into the machine shop proper. Now the space made available is to be filled with new machine tools of larger capacity than any at present installed. Fig. 3 is a view of the machine shop looking down through the middle bay and showing the new erecting floor. The machine shop work is largely engine work for the Twin City Corliss and Muenzel gas engines and in a lesser degree the machining of shafting, pulleys and hangers for transmission machinery.

The middle bay is the highway for the shop. It is traversed by a 20-ton Pawling & Harnischfeger crane with a 5-ton auxiliary having under it a clear height of 34 feet. In the floor is laid a broad gage track for trucking material. On either side near the columns are located the heavy tools, large lathes, planers and horizontal boring mills. Throughout the shop the various tools are grouped together, shapers, lathes, drills and boring mills and lighter tools being in the side bays. In both side bays are galleries, running the length of the shop, where the small parts are mabench. In fact all part of the engines holt, Cleveland Machine Screw Co. and Jones & Lamson lathes are installed for machining the various bolts, studs, valve gear parts, rods and the like, though all the valve parts are finished by hand on the bench. In fact, all parts of the engines which require a fit or true bearing surface, the crossheads and connecting rods, are worked over by hand and the proportion of that kind of labor is unusually large.

One of the galleries has heretofore been used for the most part as a stock room, but since the completion of the erecting shop the stock room has been moved to the ground floor of the side bay adjoining the erecting floor. The stock room is thus close at hand for the assembler. In addition it is proposed, when a job is ready for assembling, to draw an order on the stock room for every part required, issue the material in one lot to the assembling floor and thus avoid the continual traveling to the stock room for supplies.

In the machine work, horizontal boring tools are largely used, one in particular being interesting. Built like a lathe, with the boring bar chucked in the headstock and supported at the other end in a bearing mounted on the ways, this tool con-

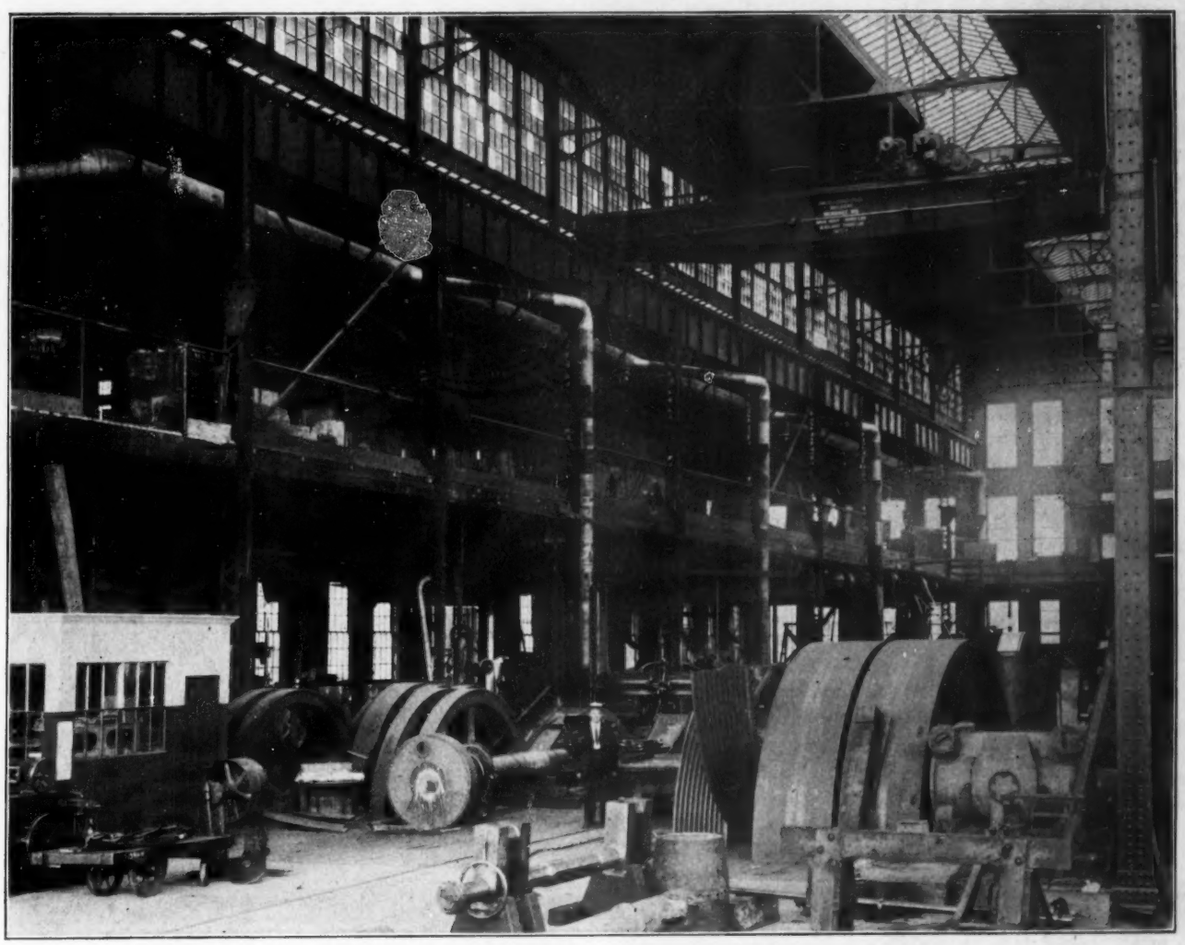


FIG. 3.—INTERIOR OF MACHINE SHOP.

structed by the Niles Tool Works was used for boring the cranks shown in Fig. 4. The cranks were set on a face plate substituted on the ways of the lathe for the usual tool carriage and connected in the usual manner with the feed mechanism. Two tools were set in the boring bar, thus machining two cranks at each setting.

For boring the cylinders and valve seats at one setting, two boring machines have been rigged up, one for cylinders up to 18 inches and a larger one for the bigger sizes. Two stands are bolted to the machine table, one at each end for supporting the boring bar and the cylinder is set between them. For machining the valve seats there are two boring bars, one for the live steam and one for the exhaust valves, top and bottom, and they are mounted on boxes fastened to the vertical ways of the machine. This arrangement affords an easy accommodation to the various sizes of cylinders and facilitates handling of the piece. A simple rig has been devised for driving the boring bars from the line shafting.

The guide sections are also turned up on a horizontal boring mill, the one used being built by the Niles-Bement-Pond Co. The bearing surfaces in the bed of the engines, where the journals for the crank shafts are set in, are planned, top and sides by setting the engine bed crosswise on the planer table. Planers built by the G. A. Gray Planer Co. are used. The large fly wheels and cast iron columns are machined in the yard on special rigs. A number of other special rigs are also in use; one of them a very simple device for testing the dashpots before they leave the upper gallery where they are machined. It consists of a connecting rod and crank disc mounted on a light frame that carries a driving pulley and friction brake. The crank which has a knockoff block like the Corliss valve gear is driven from the pulley shaft and in turn drives the friction wheel. The dashpot rod is also fastened to the friction wheel and when that is released by the knockoff the action of the dashpot can be tested for any pull or speed desired.

Erecting Floor.

The erecting floor is the new addition 60 x 193 feet just built. The

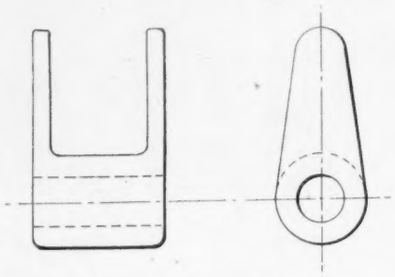


FIG. 4.—SHAPE OF CRANK MACHINED IN SPECIAL RIG.

entire floor space is free of columns and provision is made for erecting and testing both the Corliss and the gas engines. For the latter a suction gas producer has been set up and the entire outfit is given a commercial test before leaving the shop. A 30-ton Pawling & Harnischfeger crane with a 5-ton auxiliary runs across the shop and a track runs in from the shipping yard at one side. A somewhat novel gas engine plant in the northwest was just turned out from the erecting floor where it was put together and tested. It consisted of a duplex set of gas engines of 150 horsepower each with a direct connected generator between them, being analogous in arrangement to the common steam engine generator plant. Fig. 5 shows one of the Muenzel gas engine plants on the floor, and Fig. 6, one of the Twin City Corliss engines, the machine work on both of which are above criticism, the plant having its own inspection system.

Blacksmith Shop and Plate Shop.

As indicated in the general ground plan the blacksmith shop occupies a separate section of the steel storage building and the plate shop the lower floor of the pattern storage. The blacksmith shop is equipped with steam and belt-driven hammers, Ajax forging and upsetting machines and an installation of Acme bolt and thread cutting machinery. In the plate shop the material for steel elevators, hoppers and stacks is prepared and an equipment of punches and shears constitute the necessary machinery.

Structural and Bridge Shop.

The structural shop is 136 x 294 feet, of the same design as the other buildings, but has only 12 supporting columns in the entire shop, making it roomy and convenient. This is shown in Fig. 7 which is a view of the interior. The machinery, most of which was supplied by Williams, White & Co., and Hillis & Jones, is driven entirely by individual motors, the air drills and Hanna portable riveters excepted of course. The rivets are heated in oil burning stoves located conveniently and this feature strikes one as an excellent arrangement. Like all the other cranes the

FIG. 5.—MUENZEL GAS ENGINE ON ERECTING FLOOR.

FIG. 6.—CORLISS ENGINE AND ERECTING FLOOR.

FIG. 7.—INTERIOR OF STRUCTURAL SHOP, MINNEAPOLIS STEEL & MACHINERY CO.

one in the main bay in this shop is a Pawling & Harnischfeger. It has a capacity of 15 tons with a clear height under the crane of 27 feet. In the side bays, boom cranes with air hoists, hung from columns, handle the smaller material.

For drilling the built up columns, light trusses and struts a group of six radial drills supported from as many columns at one end of the shop arranged in a much smaller space than would be possible with ordinary drill presses. There is but one drill press, and that a 42-inch, near the group. The shop is also equipped with the other necessary tools commonly found. The heavier shapes, large I-beams and channels are cut and handled in a lean-to shed. A set of rolls run out from this shed to the stock yard and the material is delivered by means of this table to the shearing and punching tools in the shed. The tools installed have a capacity up to 15-inch I-beams.

Stock Yard.

As mentioned above, the yard for stocking the steel plates and shapes is centrally located with respect to the departments requiring this material. This space is about 150 x 300 feet and between this and the adjacent storage building for the material which requires protection, about 50,000 tons of steel and iron are kept in stock constantly. In the yard, as indicated in Fig. 1, showing the roll house, is a set of rolls for rolling plate. To assist in handling the stock in this yard, two cables have been stretched across from building to building, each carrying a lifting tackle manipulated by hand.

Laboratory.

The material used in the manufacture of this company's products is carefully analyzed in its own chemical laboratory. This laboratory has been added during the past year and is provided with the most modern and approved apparatus for keeping the material up to grade. The laboratory is also provided with complete apparatus for testing gas, so that knowledge of the performance of the gas producers is kept constant. The paint used on the products is all kept up to standard by careful and frequent analyses and the company analyzes all the oil and fuel used in its own plant. A material testing machine is used for testing all finished material so that every possible avenue is watched to keep the products uniform, reliable and satisfactory.

Power Plant and Equipment.

The motive power for operating the plant is of two kinds and here some interesting comparisons have been worked out between the steam plant and generator and the gas engine. For the most part the power is supplied by two simple non-condensing Twin City Corliss engines driving generators, the current being distributed to motors in the various shops, where, with the exception of the structural shop the group drive plan has been adopted. The engines are 13 x 36 inches and 12 x 30 inches and the generators, one a Crocker-Wheeler, one a Milwaukee Electric and one an Electric Machinery, have an aggregate capacity of 390 kilowatts at 230 volts.

The remainder of the power is supplied by a 55-horsepower Muenzel gas engine and producer, located in the plate shop, which runs the plate shop and the pattern shop and is said to furnish its quota of power more cheaply than any of the other units.

The distribution of power is shown by the following statement. The shop equipment consists of motors aggregating more than 800 horsepower exclusive of the crane motors. They range in size from 5 to 50 horsepower and use direct-current at 220 volts. Most of them are Crocker-Wheeler shunt wound machines and they are distributed through the

shops in the following percentages calculated from the rated horsepower of the motors:

Machine shop	31.45 per cent.
Structural shop	26.83 per cent.
Foundry	17.93 per cent.
Blacksmith shop	5.49 per cent.
Plate shop	5.49 per cent.
Pattern shop	4.88 per cent.
Yard rolls	3.05 per cent.
Casting cleaning rooms	2.44 per cent.
Fitting shop	1.83 per cent.
Storage warehouse	0.61 per cent.

The motors in some of these shops are used only occasionally, as for instance, the pattern and plate shop motors, which are not used except for small over-time jobs, and the cupola motors in the foundry, aggregating 100 horsepower, which are used only from two to four hours per day.

The water supply for the boilers and the plant has to be obtained from a well which has been drilled to a depth of 720 feet. The water is supplied at the surface at a pressure of 50 to 100 pounds by an 8 x 5¾ x 36-inch Cook deep well pump. The boilers, four in number, are 66 inches x 18 feet and of the return tubular type. A two-stage air compressor, manufactured by this company, having a capacity of 70 cubic feet of free air per minute supplies the pneumatic requirements.

The plant has adequate shipping facilities, both in its yards and in the matter of railway connection. It has two locomotive cranes and five large boom cranes which swing within a radius of 75 feet from the center of the shipping tracks. The plant site is on the C. M. & St. P. railroad which has connections with all the railroads entering Minneapolis.

ACID OPEN HEARTH SLAG

BY W. M. CARR

IN AN acid lined steel melting furnace, one in which the hearth is formed by refractory silica sand, the only elements in the melting stock affected by the action of the slag formed are the manganese, silicon and carbon. The foregoing are not regarded as impurities. The impurities, phosphorus and sulphur are not subject to removal by such a slag.

At the end of the conversion period, the quanties of manganese and silicon originally present will be reduced to traces, and the original amount of carbon in the bath of metal may be removed to a point that it is deemed necessary to tap the furnace.

The amount of phosphorus remaining at the same period will equal the quantity carried in with the melting stock plus that yielded by additions of iron ore made during the progress of conversion. It will be slightly increased in percentage because of loss of metal in melting. In other words there will be under normal conditions of practice, less metal taken out of the furnace than was charged, the difference or loss being due to an unavoidable burning or oxidation of the stock. Since there is no absorption of phosphorus by the silicious slag, the gain in the element in question in the finished material over the amount charged will be in keeping with the loss in metal.

For the same reasons there will be a gain in sulphur in the finished material over the raw, in varying quantities, also depending upon the character of fuel used and the speed in melting. In the United States, producer gas made from bituminous coal carries more or less sulphur. The flame from such a gas passing over a charge of metal being treated in an acid lined furnace, gives up some of its sulphur to the metal while it is melting, but as soon as the mass becomes liquid and passes below the covering slag, there is no further contamination by the flame, nor removal of sulphur by slag action. The greater the quantity of sulphur in the fuel, the greater the time of exposure to flame before complete fusion, the greater will be the absorption of the element in question.

Manganese, silicon and carbon usually present in varying quantities in acid melting stock, charged in a Siemens or open-hearth furnace, yield to an oxidizing influence partly by reason of the flame and partly by the slag. The first two elements known as a metal and metalloid respectively, become changed to their several oxides and finally enter the slag as combined silicates and unite with whatever oxide of iron may have formed through the effect of flame action previously described. The carbon, also a metalloid, submits to a similar oxidizing action at different stages of conversion, but instead of entering the slag as a solid oxide, passes away as a gas and mingles with the products of combustion from the fuel. In the exit of the gaseous carbon there will be more or less agitation of the bath by bubbles formed by the reaction between the solid carbon in the metal and the ferrous oxide dissolved in it and that of the slag.

The composition of an acid slag is made up from sand adhering to the cold melting stock, hearth scorification, oxidation of the manganese and silicon present in the charge and oxidation of iron by flame action as de-

The volume of the slag will vary with the character of the charge, the nature of the fuel, the necessary additions of iron ore and the manipulation of the heat. It is regarded as a ferrous silicate and consists of nearly equal parts of silica and ferrous oxide. Should manganese be present in the stock, its resultant oxide will replace some of the ferrous oxide but the sum of the two oxides will nearly equal that of the silica.

As the period of melting and conversion proceeds the volume of the slag will increase, but under normal conditions, the relative amounts of acid (silica) and bases (iron and manganese oxides) will be fairly constant throughout the progress of the heat. The adjustments are self-regulated and the maximum volume of slag is reached at the end of the charge conversion. There may be near the end of the operation a decrease in the percentage of manganese oxide in the slag by an increase in the iron oxide brought about by additions of iron ore without materially changing the ratio between the acid and bases. With normal conditions the fluidity of the slag and its requisite composition is practically automatic and it is unusual for an acid open-hearth slag to need readjustments by outside agencies.

Production of Aluminum.—During 1906 the United States consumed 14,910,000 pounds of aluminum, exporting aluminum products to the value of $364,251. The production in 1905 was 11,347,000 pounds.

David Gessner, maker of cloth finishing machinery, in Worcester, is to build a factory. Heretofore he has rented. The main building is to be 60 x 230 feet, one story. There will be two ells, one 30 feet and one 40 feet wide.

A PERFECT COST SYSTEM.[1]

By F. E. Webner.[2]

The title of this article perhaps seems somewhat sweeping and to modify it to some extent let us consider that such a cost system can be perfect only to the degree that the conditions surrounding the operation of such a cost system are perfect, and as no conditions can be fully perfect, therefore no cost system can be perfect. However, let us for effect allow the caption to remain unchanged but consider that it means the cost system to be outlined is as nearly perfection as it is possible to attain perfection. Job machine shops could not use the plan which is to be outlined nor could shops which have a varying and constantly changing product use the idea to advantage, but it is good for those shops where the same classes of machines are produced each season with possibly an occasional improvement or addition or even a gradual metamorphosis or evolution but not a constantly recurring revolution. Where the product is unchanged, save for occasional improvement, there seems, at first thought, to be no need of a cost system in that same broad degree that shops with a varying product need a cost system, and if the cost system in either case be installed merely to find that a given machine costs what the records will show it to cost and not as to why it costs that much, then it would appear as though the "game were not worth the candle." If, on the other hand, the cost system is to be used as a tool for cutting down cost, then it is not only worth while but highly advisable. The plan considered in this article is not necessarily confined to the use of machine shops, but works most admirably in the manufacture of furniture, harness, soap, carpets, agricultural implements and in fact any product where the styles, patterns or grades are standard. A catalog with list prices is a desirable adjunct to this seemingly arbitrary plan for, with the list as a basis, each of the three production elements in each of the successive production departments through which the goods in process pass can be put on a percentage plan whereby a fixed amount of the list price is registered (as hereinafter described) as being the cost of each particular element under consideration as for instance a certain machine is listed at $75.00, the cost might be registered as follows:

Department A—Material seven per cent; labor three per cent; expense two and five tenths per cent. Department B—Material four and seven tenths per cent; labor two and nine tenths per cent; expense two and four tenths per cent. Department C—Material three and six tenths per cent; labor two and six tenths per cent; expense two and one tenth per cent. Department D—Material two and nine tenths per cent; labor five and two tenths per cent; expense four and nine tenths per cent. By taking totals of departments we find Department A to be twelve and five tenths per cent, B ten per cent, C eight and three tenths per cent and D thirteen per cent. By taking totals of each element irrespective of departments we find that the element of material costs eighteen and two tenths per cent, labor thirteen and seven tenths per cent, and expense eleven and nine tenths per cent on a grand total cost of forty-three and eight tenths per cent of list price. Now the first objection to be put forth is that those percentages will vary, which the writer freely and unhesitatingly admits. Incidentally so will costs vary under any plan that might be evolved, and if they did not vary a cost system would be superfluous. The answer to the first, and in fact the only valid objection that can be raised, can serve a manifold purpose in that at the same time it will answer the objection, set forth the beauties of the plan and present the reasons why it is nearer perfection than any other plan—in short the entire article constitutes the answer.

This plan uses arbitrary figures merely as a basis of computation—a known starting place just as in starting a foot race when a line is drawn in the sand and each participant puts his foot thereon—the result of the run can be determined based on the starting point. Just so with the costs; the results can be accurately determined based on the starting point; the variations which are almost bound to obtain can be duly recorded and used for statistical purposes, the fluctuations in each item being shown by percentages. The arbitrary figures should naturally be just as near the actual cost as it is possible to arrive, although for any reason it is desired to keep actual cost figures from all but one or two trusted employes then absolutely fictitious figures may be used as a basis just so long as there is maintained somewhere a record of the difference between the actual and fictitious.

The same identical plan of costs that has been outlined in previous articles is used under this plan with the exception that in this case every individual shop order does not, of necessity, have to be put through the cost process but all the shop orders for the period are bunched, as it were, with a controlling account for each of the three production elements and the ability therefrom to determine percentages of variation above or below arbitrary figures.

If shop orders for certain integral parts of the product are put through so frequently that detail costs are positively not necessary for every recurrence of the order and, moreover, if the abitrary figures represent the mean percentage found under the previous cost tests then, under the plan now considered the recurring orders can be put through without individual cost tests being made any oftener than is desired, the management still being secure in the fact that all the conditions of possible weakness will be reflected just the same as has been outlined in foregoing articles. In cases where parts are made ahead for stock and the shop orders for such parts are not frequent then it may seem wise to put the orders through with a test each time and by a test is meant that attenion to individual shop orders that, under conditions other than obtain with this plan, is necessary to every order in process. Herein lies the chief beauty of this plan: that individual cost tests need not be put through any oftener than desired and yet, by means of the controlling accounts, have the variations recorded. The result is that the cost system under this plan becomes expansive or contractive and enables the management to work out detailed operation costs, upon as many or as few shop orders as desired. Incidentally for all machines a record should be kept of the costs of production, dividing or grouping such costs by physical elements and subdividing such elements into integrants, making a detailed cost analysis. The form for such a record must of necessity be especially prepared and will be easiest handled if made in sections and each section punched for a loose leaf binder. Consider the sections as having fifty horizontal lines on the page; each section then will represent fifty integrants, therefore if the machine has two hundred integrants it will take four sections to accommodate the detail cost of the entire machine. Each section is composed of the master sheet with a short sheet for each two departments of the shop—one department being on each side the master sheet to show information as to the name of the element, the name of the integrant, number of intergrants needed in the element, information as to where, if any place, the same integrant is used in common on other elements and again on other machines, etc., etc. On the department pages to be shown columns for semi-finished goods cost called "process" (parts from preceding departments) raw material and burden (diffused expense) then columns for individual operations as for instance cut-

[1]Twelfth and final article of series on cost keeping.
[2]Certified public accountant, Cincinnati.

ting, filing, drilling, bending, planing, turning, etc., etc., with a final column for "Total in this Department." On the last page to be a series of columns representing one each for the different producing departments in which will be shown the totals of each department, thus arriving step by step at the entire cost of the machine. There can also be columns for summarizing the cost of the machine by production elements, viz: material, labor and diffused expense irrespective of departments.

As costs are presumably to be worked out on integrants and each integrant therefore will have its comparison sheet of cost fluctuations, then the cost record just illustrated can be compiled by means of cost averages for each integrant taken from such comparison sheets or can be compiled entirely from cost tests as may be desired by the management.

These detailed cost analyses can be maintained in comparative form for statistical purposes and it is from these compilations that the arbitrary cost percentages can be accurately arrived at and, in fact, so accurately that the term arbitrary becomes a misnomer even when such costs are used as a comparison only.

A pre-requisite to the plan of costs is a series of sheets preferably in a loose leaf binder with one page for each element or integrant on which costs are to be worked out on these sheets. On these sheets are to be columns for showing dates, shop order numbers, number and nature of operations necessary, then the cost of material, labor and diffused expense by totals based on the shop order register and any fluctuations from arbitrary figures. About one quarter way from the bottom of the page can be ruled off a space to be reserved for the arbitrary figures (hereinbefore described) which will possibly be changed from time to time to meet changing conditions. This bottom space is to use the same column headings as the top space, the only difference being a line of demarkation between the percentage figures and the figures obtained from tests. As the figures obtained from tests will vary, these cost sheets can be used to average the tests and thereby obtain figures for statistical purposes and also can be used to disclose possible weaknesses.

The cost register as explained in previous articles, is an important adjunct to this plan and is used in conjunction with ledger accounts, with the totals of which it must be subjected to comparison. There must be a ledger account for physical production element in each separate department as for instance, material department A, labor department A, expense department A, material department B, labor department B, etc. Charges against the several accounts are made direct to the particular accounts in question, as material or labor is supplied or expense incurred, the controlling or synthetical accounts under "goods in process" in the general exhibit getting the corresponding charge through proper channels. As goods are completed the percentage plan is applied as a basis for the credit and the percentage being determined on each element (material, labor and expense) the values thus determined are extended into the proper columns in the cost register opposite the order numbers completed, and the totals of such columns for each department become credits to the corresponding accounts in the ledger. If the reader will reflect a moment he will see clearly that each ledger account will have had debit on a positive basis and credit on an arbitrary basis hence there will be a variation as time proceeds and at least four times per year, there should be an inventory of the physical condition of each department element represented by a ledger account, as for instance, department A, material, department A labor, etc. Some accounts will be found to have over run and some other accounts under run and as differences are found one way or another they are charged or credited to the reserve account for variation of weights and measures and absorbed into manufacturing expense. In cases where difference is glaringly large an investigation is usually made as to the cause and as a retrospective research is a simple matter and differences can be readily adjusted. Where tests are being put through on some two or three individual shop orders they serve as a safety valve for the entire volume of orders in the department. The amount and percentage of differences in each departmental element serves as a barometer on the plan and where differences occur frequently it usually is the result of a weakness and probably can be remedied. By applying the inventory results to the arbitrary cost figures of any particular order covering a given period we can consider each departmental element in its turn and add to or take from the arbitrary figures in their proper proportion accordingly to the accounts run over or under, hence without a large volume of clerical work we are enabled to get accurate costs on all the product.

W. H. Judson Co. of Portland has purchased the Estacada Manufacturing Co.'s plant, Estacada, Ore., with additional grounds and announces that it will install a car manufacturing plant with a capacity of five cars

COLD TWISTED STEEL RODS FOR CONCRETE REINFORCEMENT.

At the recent meeting of the American Society for Testing Materials at Atlantic City, Jesse J. Shuman presented a paper on the above subject, of which the following is an abstract:

If square bars of any size be twisted until they have made one complete turn in nine times the dimensions of a side (pitch 9), the metal on the corners is stretched about 11.5 per cent, as determined by formulas for helices. The areas of squares, however, vary with the squares of their sides, so that in a small bar the average stretch is greater than in a large bar, and the increase in strength is correspondingly greater. The moment the twisting machine has created a permanent set in the fiber, the steel has begun to increase in strength. As the twisting proceeds, the yield point ascends more rapidly than the ultimate strength. There is a point, however, at which the maximum strength of the bar is reached and beyond which it is reduced somewhat before the bar twists apart.

The behavior of half-inch squares of three widely different grades is shown in table I. It is a mistake to specify a number of turns approaching the maximum strength of the steel for the internal strains in such a bar are already nearly enough to destroy it. In the writer's opinion the number of turns should be about half the number at which the steel is at its maximum strength. In the ordinary soft Bessemer product this is one complete twist in eight to ten times the side of the bar. Basic open-hearth squares of similar grade should have a pitch of five to seven in order to have their best properties developed. If carbons higher than ordinary structural grades are insisted on, a proportionate concession must be made in the number of twists.

Quality.

Bessemer steel containing carbons up to 0.4 per cent can be twisted successfully and are high in tensile properties, but have the same brittleness that constitute the strongest arguments against many hot-rolled and hot-twisted bars. Table II shows tests on plain and cold twisted bars of soft Bessemer steel. On low-phosphorus steel, the effect of twisting is not as marked as on Bessemer steel, the behavior in this respect being quite similar to that of the same steel when cold-rolled or cold-drawn. Table III is similar to Table II, excepting that the bars are of open-hearth steel of 55,000 to 65,000 pounds tensile strength.

Elastic Limit.

The elastic limit is a feature of highest importance from the engineer's stand-

TABLE I.

EXPERIMENTS WITH ½-INCH TWISTED SQUARES, SHOWING THE EFFECT OF INCREASING NUMBER OF TWISTS.

Grade.	No. of Turns per Foot.	Yield-point. Lbs. per sq. in.			Ultimate Strength. Lbs. per sq. in.			Elongation in 8 in. Per cent.		Reduction of area. Per cent.		Elastic Ratio.	
		Plain.	Twisted.	Increase. Per cent.	Plain.	Twisted.	Increase. Per cent.	Plain.	Twisted.	Plain.	Twisted.	Plain.	Twisted.
Soft Bess.	3	41600	65600	57.7	60400	83200	37.7	28.25	10.00	64.0	49.6	68.9	78.8
"	4¼	39200	72400	84.7	60000	89600	49.3	28.75	5.75	63.4	31.2	65.3	80.8
"	5	41600	84800	103.8	60800	92000	51.3	30.50	6.25	65.8	36.0	68.4	92.2
"	5¾	40800	84000	105.9	60400	90000	49.0	30.00	7.50	64.6	40.0	67.6	93.3
"	5⅞	40000	80800	102.0	60800	88800	46.0	27.5	3.75	60.9	25.2	65.8	91.0
Bess. .25 Carb.	3	48800	83600	71.3	74000	96000	29.7	25.0	8.0	53.8	48.9	65.9	87.1
"	4½	51200	83200	62.5	75200	99200	31.9	25.0	4.5	51.0	46.7	68.1	83.9
"	4⅞	52800	88800	68.2	75200	104000	38.3	24.0	4.0	54.4	44.5	70.2	85.4
"	5	51200	84200	64.4	75600	102000	34.9	22.5	5.75	50.3	44.5	67.7	82.6
"	5½	53200	84200	58.3	75200	100800	34.0	23.0	6.0	51.0	28.6	70.7	83.5
Soft O. H.	3	31200	46000	47.4	46400	64000	37.9	33.0	8.0	74.0	70.8	67.2	71.9
"	5	31200	60800	94.9	47200	68000	44.1	32.5	5.75	68.7	59.0	66.1	89.4
"	7	31200	68800	120.5	46000	76000	65.2	37.5	6.75	73.0	67.0	67.8	90.5
"	9	31200	67200	115.4	47200	71200	50.8	34.0	5.0	74.5	28.6	66.1	94.4

Note:—Bars of each grade twisted off when given more turns than here shown. The "elastic ratio" is the ratio between yield-point and ultimate strength.

point. In this respect the cold-twisted square excels all hot-finished sections and will always do so, for its elastic limit of 60,000, 70,000 and even 80,000 pounds permits the use of less steel for the same service than can be guaranteed by its competitors.

Specifications.

The author offers the following suggestions as a broad foundation for specifications:

1. *Process* — Specify whether open-hearth or Bessemer steel is to be used, or either. Open-hearth steel should contain less than 0.04 per cent phosphorus for basic and 0.06 per cent for acid steel.

2. *Carbon*—This should usually be left to the discretion of the manufacturer who insists that when carbon limits are named the tensile requirements should be left open.

3. *Elastic limit*—For squares ½ inch and smaller, at least 65,000 pounds per square inch; for squares ⅝ inch to one inch, at least 60,000 pounds per square inch, and for squares 1⅛ inch and larger, at least, 55,000 pounds per square inch.

4. *Ultimate strength*—To be recorded.

5. *Elongation*—At least five per cent in eight inches or 12 per cent in two inches.

6. *Reduction of area*—To be recorded.

7. *Bend*—Bars to bend cold around a pin twice their size without distress.

8. *Number of turns*—For Bessemer steel one complete turn in eight to ten times the size of the square.

9. *Number of test pieces*—One tension-test specimen and one for bending test for each melt used in each size.

10. *Inspection*—All tests governing the inspection of material to be made at manufacturer's works. Inspector to have access to the bars prior to shipment, but the manufacturer is not relieved thereby from responsibility for unsatisfactory material. In this connection, it may be stated that each bar is thoroughly cleaned by the twisting process and that each piece is in a large measure tested at the same time, as no imperfect bar will stand the cold-twisting process.

TABLE II.

TESTS ON PLAIN AND COLD-TWISTED STEEL BARS, SOFT BESSEMER STEEL. Number of Turns, Ordinary.

Size. Inches.	No. of Turns per Foot.	Yield-point. Lbs. per sq. in.			Ultimate Strength. Lbs. per sq. in.			Elongation in 8 in. Per cent.		Reduction of area. Per cent.		Elastic Ratio.	
		Plain.	Twisted.	Increase. Per cent.	Plain.	Twisted.	Increase. Per cent.	Plain.	Twisted.	Plain.	Twisted.	Plain.	Twisted.
¼ x ¼	4	36800	80000	117.4	65600	92800	41.5	19.50	8.00	64.0	53.8	56.1	86.2
¼ x ¼	4	38400	78400	104.2	68800	91200	32.5	17.50	7.50	64.0	56.5	55.8	86.0
⅜ x ⅜	3½	39130	71160	81.8	61180	85380	39.5	26.00	10.00	67.8	55.5	63.9	83.3
⅜ x ⅜	3½	39830	72560	82.2	62330	85380	37.7	28.00	12.00	62.4	60.8	63.9	85.0
½ x ½	3	41600	65600	57.7	60400	83200	37.7	28.25	10.00	64.0	49.6	68.9	78.8
½ x ½	3	38600	66000	71.0	63100	91200	44.5	27.75	10.00	61.7	48.1	61.2	72.4
⅝ x ⅝	2½	40020	73860	84.5	63100	85560	35.6	26.00	9.50	63.8	55.6	63.4	86.3
⅝ x ⅝	2½	40940	74180	81.2	64640	84960	31.5	28.00	11.00	61.2	56.7	63.3	87.3
¾ x ¾	1½	40340	74680	85.1	60450	80860	33.8	30.00	13.50	64.0	55.5	66.7	92.4
¾ x ¾	1½	39120	72720	85.9	60080	81060	34.9	31.00	14.00	62.4	58.1	65.1	89.6
⅞ x ⅞	1¼	39380	71340	81.2	59460	77960	31.1	34.00	13.75	59.2	58.5	66.2	91.5
⅞ x ⅞	1¼	39640	68700	73.3	59200	75980	28.3	34.00	10.00	61.1	56.3	67.0	90.4
1 x 1	1	36000	66000	83.3	61000	73900	24.4	32.00	6.50	59.6	43.0	59.0	89.3
1 x 1	1	37400	67500	80.5	61000	74000	21.3	33.00	9.00	56.7	53.1	61.3	91.2
1⅛ x 1⅛	⅞	37550	61640	64.1	58820	70680	20.2	30.00	12.50	60.1	49.3	63.8	87.2
1⅛ x 1⅛	⅞	38330	63100	64.6	58820	70580	20.0	31.00	12.50	56.6	50.6	65.0	89.4
1¼ x 1¼	¾	39530	61100	54.5	61420	78950	28.5	30.00	12.00	47.5	36.0	64.3	77.4
1¼ x 1¼	¾	38251	62510	63.4	61300	79270	29.3	30.00	6.00	45.2	31.5	62.3	78.8

TABLE III.

TESTS ON PLAIN AND COLD-TWISTED STEEL BARS, OPEN-HEARTH OF 55-65,000 LBS. TENSILE STRENGTH.

Number of Turns, Special.

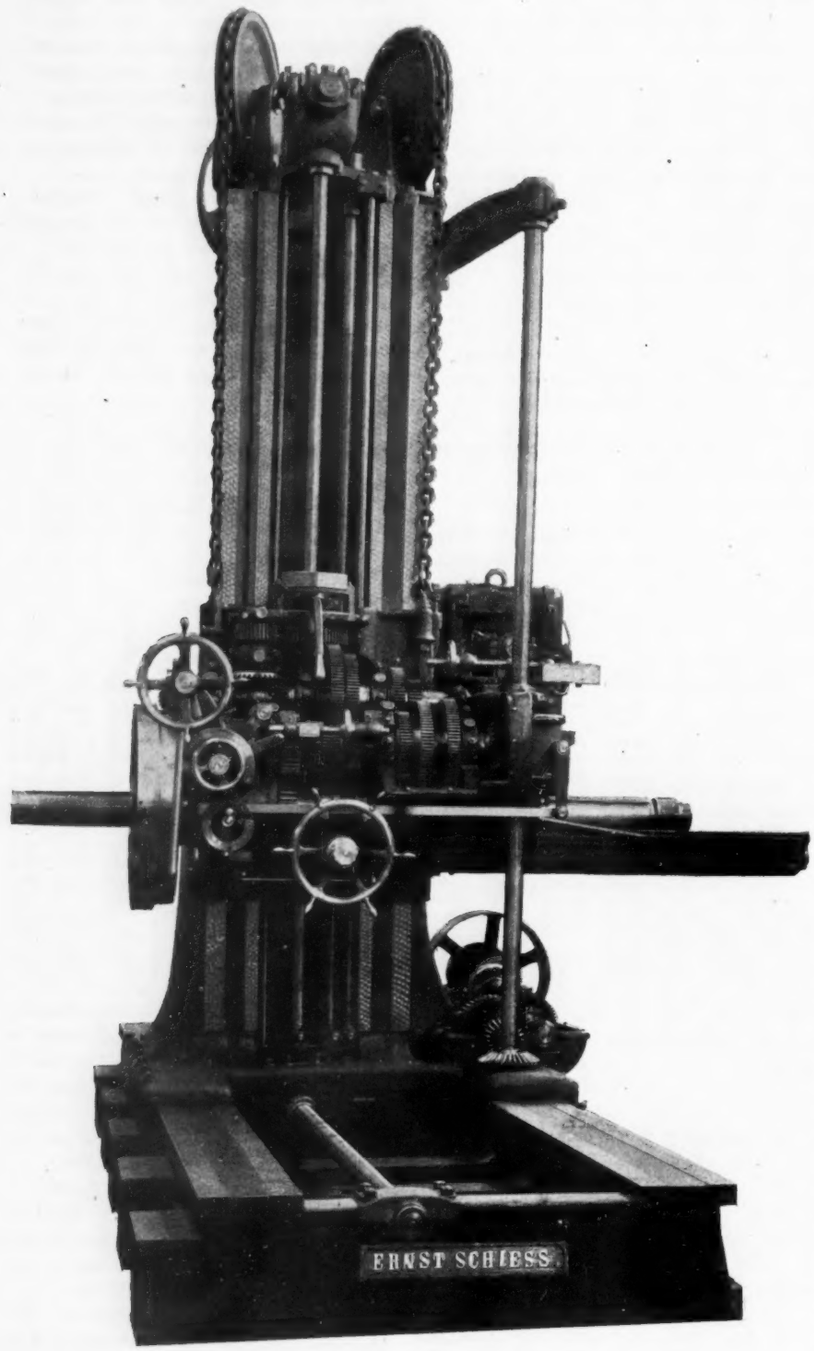
Size. Inches.	No. of Turns per Foot.	Yield-point. Lbs. per sq. in.			Ultimate Strength. Lbs. per sq. in.			Elongation in 8 in. Per cent.		Reduction of area. Per cent.		Elastic Ratio.	
		Plain.	Twisted.	Increase. Per cent.	Plain.	Twisted.	Increase. Per cent.	Plain.	Twisted.	Plain.	Twisted.	Plain.	Twisted.
¼ x ¼	5	38000	58000	52.6	61200	92000	50.3	27.25	5.25	64.0	11.6	62.1	63.0
½ x ½	5	37600	60000	59.6	60400	91200	51.0	28.75	5.25	65.2	31.5	62.2	65.8
⅝ x ⅝	3½	34130	60000	75.8	58660	75450	28.6	27.50	6.25	62.5	55.2	58.2	79.5
⅝ x ⅝	3½	34880	58480	67.7	58220	76060	30.6	31.25	8.00	61.1	53.7	59.9	76.9
¾ x ¾	2½	31170	52800	69.4	57020	69670	22.2	31.00	7.50	61.2	46.5	54.7	75.8
¾ x ¾	2½	34370	55770	62.3	57050	69300	21.5	28.75	7.50	59.7	44.8	60.3	80.5
⅞ x ⅞	2	35660	65960	85.0	60740	78110	28.6	30.00	6.50	60.5	27.6	58.7	84.4
⅞ x ⅞	2	35000	60870	73.9	59430	71580	20.4	29.00	8.25	50.3	45.7	58.9	85.0
1 x 1	1¾	33120	57920	74.9	57430	67480	17.5	31.00	9.00	52.5	43.1	57.7	85.8
1 x 1	1¾	33360	54350	62.9	59060	72300	22.4	30.75	6.00	54.0	26.8	56.5	75.2
1⅛ x 1⅛	1½	38560	66140	71.5	68760	82560	21.5	32.50	7.75	49.3	14.8	56.0	80.1
1⅛ x 1⅛	1½	32350	57290	77.1	56150	72570	29.2	32.25	5.25	60.7	14.6	57.6	78.9
1¼ x 1¼	1½	33740	62230	84.4	55550	68890	24.0	30.00	7.75	46.7	30.7	60.7	90.3
1¼ x 1¼	1½	32950	57140	73.4	55810	73340	31.4	32.00	6.25	52.0	24.6	59.0	77.9

Within a period of only 24 days No. 3 blast furnace of the upper works of the Jones & Laughlin Steel Co., Pittsburg, was relined and new connections were erected between the dust catcher and the centrifugal dust separator. The furnace was blown in again on Aug. 31. On a previous lining this stack made over 1,023,000 tons. This company is now erecting 10 rectangular ovens 5 x 36 feet at its coke plant. These will be placed in operation the latter part of September.

A RECENT GERMAN MILLING AND BORING MACHINE.

By Frank C. Perkins.

The accompanying illustration shows a boring and milling machine, built at Dusseldorf by the Ernest Schiess Werkzeugmaschinenfabrik Actien-Gesellschaft. It consists of a bed carrying a column which is movable in one direction along the bed. On this column is carried a counterbalanced headstock provided with both automatic and hand-power motions. Provision is made for both uniform and accelerated speed on traverse.



German Boring and Milling Machine.

The boring spindle is of steel and is carried in a cast iron sleeve running in adjustable bronze bearings. A 15-horsepower motor fitted on the standard provides motion to the headstock through gearing. The headstock drives the boring spindle either direct or through gearing, 20 speed changes being available.

The boring and milling feeds are obtained by a train of gears, eight changes being possible. These are driven from the main spindle by a simple and easily examined construction, all hand wheels and levers for the control being carried on the headstock. The rear end of the boring spindle is carried on a sliding block, which moves along a slide screwed to the back of the headstock. The spindle is provided with an automatic or hand feed operated through a coarse pitch screw.

For the traverse of the column on the bed, in addition to the milling feed, a quick power motion is provided as well as a hand regulator for exact adjustment. All gears are of steel with machine cut teeth and all high speed shafts are bushed in bronze bearings, the greater number of which are in two parts.

The principal dimensions of this machine are shown in the following table:

Diameter of boring spindle, 7 inches.
Length of boring feed, 5 feet 4 inches.
Vertical traverse of headstock, 10 feet.
Horizontal traverse of column, 20 feet.
Revolution of spindle per minute, 10 to 110.
Milling speed per revolution of spindle, 0.014 inch to 0.375 inch.
Boring feed per revolution of spindle, 0.0047 inch to 0.125 inch.
Quick traverse of headstock and standard, about 3 feet per minute.
Approximate weight without base plate, 75,000 pounds.

LIGHT ALUMINUM ALLOYS.[1]

By J. E. Stacey Jones.

Aluminum is not used for technical work, as in motor car construction, in a pure state, as its strength is not sufficiently great. The light alloys of aluminum, in contradistinction to aluminum brasses and bronzes, etc., may be divided into two classes for convenience:

(1) Alloys of aluminum, copper and zinc, in various proportions.

(2) Alloys of aluminum with such metals as tungsten, nickel, manganese, silicon, antimony, titanium, chromium and silver, with or without either or both copper and zinc.

Copper-zinc alloys generally contain about 2.5 per cent of copper, 85 to 95 per cent of aluminum, and the remainder zinc. In ordinary sand castings it is difficult to get more than 12 tons tensile strength, unless they are water-chilled. If cast in metal molds their strength is also increased.

In tungsten alloys, such as wolframinium, it has been found that a fraction of 1 per cent of this element makes metal for tubes, sheets, strips, etc., much stronger, and increases the resistance to corrosion. It also renders the alloy able to be spun, drawn, or rolled well, and antimony gives good casting properties. This alloy has a specific gravity of 2.75 and contains about 0.1 per cent of tungsten.

[1] From a paper read at a recent meeting of the Coventry Engineering Society.

SOME NEW STOEVER PIPE MACHINERY.

A Pipe Threading and a Pipe Bending Machine.

In the accompanying illustration, we show two machines just brought out by the Stoever Foundry & Mfg. Co., Myerstown, Pa. Fig. 1 illustrates a 2-inch lever type pipe-threading machine designed to cut off and thread pipe from ¼ inch to 2 inches inclusive. The bed and headstock are cast in one piece, insuring great rigidity and stiffness for the bearings, a qualification necessary in this type of machine, since the operation of the chuck brings a constant strain on the front bearing of the main spindle.

A lever type chuck comprises part of the equipment, the gripping and releasing movement being accomplished while the spindle is in rotation. The opening and closing mechanism is extremely powerful, gripping the pipe when but a slight pressure is applied to the hand lever shown on the front of the machine. The chuck holding the actual gripping parts is entirely enclosed and presents a smooth surface, all danger of the operator's clothing being caught by projecting parts being thus avoided. The adjustment of the gripping jaws is made universally and this can be done at any one of three points on the chuck. This arrangement renders adjustment convenient irrespective of the position in which the spindle stops. All parts inside the chuck are of steel.

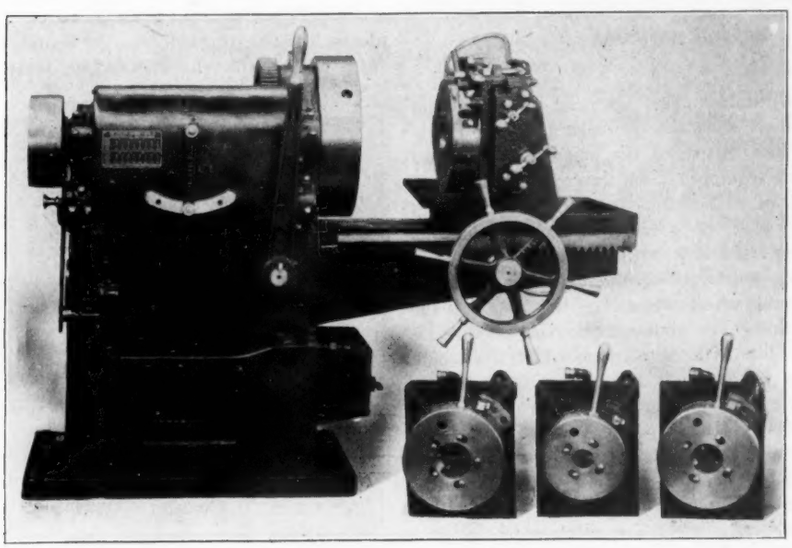


FIG. 1.—THE STOEVER PIPE THREADING MACHINE.

Nine separate speeds are provided, properly designed for threading both steel and iron pipe of all sizes within its capacity. Driving is through the medium of single belt pulley, speed changes being obtained by means of a sliding gear and clutch. A speed plate on the face of the machine gives information as to the proper speeds for the various sizes of pipe and the manner of obtaining them in the machine. No machinery is exposed, all shafting and gearing being on the inside of the machine. It can be exposed for inspection by the removal of the cover.

A set of bushings is provided for supporting the various sizes of pipe. These bushings have a bearing on each end of the spindle, extending entirely through it. Their use prevents the operator from jamming the pipe against the jaws of the chuck when the machine is working on the smaller sizes, since the jaws are always outside of the bushing, in which the pipe is placed when the chuck is open. An improved type of nipple holder is used for the manufacture of nipples, either long or short. This consists of three pieces of tool steel properly hardened and placed in the same chuck in which the gripping jaws are used. They open and close with the lever movement to release or grip the nipple while the spindle is in rotation.

The die head slides on ways on the stand which supports it and being free to slide it accommodates itself to any eccentricity in the pipe, thus relieving the dies of strain and cutting an even depth of thread around the pipe. This slide can be pushed to one side when it will entirely pass the gripping chuck. When in such position, cutting off tools can be brought up close to the gripping chuck, enabling the cutting off of the shortest possible piece of pipe. It also enables the pipe to be inserted in the machine from either end, providing a great freedom of movement to the machine.

The die head is equipped with inserted interchangeable steel cams, which take the thrust of the dies and adjust them to their proper position. Hardened steel plates are placed in the bottom of all the die slots and resist the wear of the constant contraction and expansion of the dies and keep the lead of the separate chasers correct. The front face of the head swings open, so that chasers when being changed, can be picked out of the head in any position on the cams and others inserted in their places. This operation may be rapidly performed and, at the same time, the interior of the head is exposed for cleaning or inspection.

Two cutting-off tools are used operated by the same screw and handle. A universal adjustment is provided, so that both tools are cut at the same time.

The oiling system is by means of a pump positively driven from a constant speed pulley, and which will deliver oil when running in either direction. The oil flows from the dies and cutting-off tools back in the bed of the machine and through strainers into the tank shown below the bed, whence it is drawn by the pump. A cabinet base is provided in which the dies, nipple holders, wrenches, etc., can be kept.

The machine can be equipped in two different ways, with a universal head in which all sizes of dies are used and with a separate head for each size of pipe which can be worked in the machine. The second equipment is common in jobbing shops where the demand is to change from one size of pipe to another quickly and then perhaps change again to the first size. This interchangeable

head equipment is also of value where a number of workmen are required to use the machine. In this case the heads are always set to the proper gage and it is only necessary for the workman to put the head on the machine and cut the thread.

The sliding ways are of such size that there is ample room for two heads enabling an operator to manipulate pieces of different sizes with a minimum of trouble. The net weight of the belt-driven machine with one universal pipe head, dies, countershaft and bushings is 2,500 pounds.

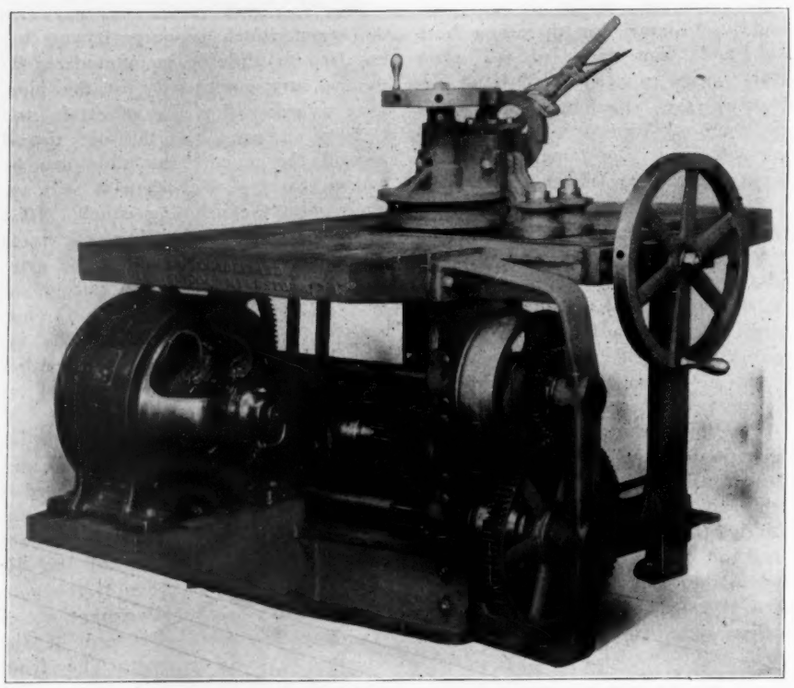


FIG. 2.—THE STOEVER PIPE BENDING MACHINE.

The Automatic Pipe Bending Machine.

Fig. 2 shows the No. 2 automatic pipe bending machine designed to bend 1-inch, 1¼-inch, 1½-inch and 2-inch pipe, the radius of bending varying between the limits of a minimum radius of 2½ inches for 1-inch pipe to a maximum radius of 12 inches for all four sizes of pipe. The machine is made in two styles either belt or motor-driven, the belt-driven machine having a single pulley, the power being transmitted through three reductions of gearing to the vertical spindle holding the main forming roller. This roller is made in two pieces, the joint being at the center of the groove in the roller. The lower half is keyed firmly to the spindle and the upper half is also keyed to the spindle and can be raised or lowered by means of a hand wheel shown at the upper end of the spindle. This division of the roller is necessary to release the bend after it has been formed, particularly in the case of 180-degree return-bends made cold.

A vise provided with two universal adjustable grips operated by the hand wheel shown is fastened to the forming roller in use on the machine. The jaws are equipped with interchangeable steel grips or bushings to fit the various sizes of pipe. A carriage in the table moves toward and away from the central forming roller, being operated by the large hand wheel shown at the side of the table. The slide carries two rollers, one in line with the forming roller and which serves to press the pipe into the latter, the other being a guide roller simply serving to keep the unbent portion of the pipe in its proper position. The slide is made adjustable to accommodate forming rollers of various radii within the capacity of the machine.

A train of gears is introduced in the transmission to give a reversed motion to the spindle, so that when the bend has been formed and removed from the machine, a clutch can be thrown into this reverse train and the forming roller returned to its starting position. Throwing the clutch in opposite positions drives the machine in opposite directions.

Tapping arms, located adjustably on the vertical spindle, which come in contact with adjustable stops on a rod connected with the clutch mechanism, will throw the clutch out on either the forward or reverse movement of the spindle at any predetermined position, thus insuring absolute duplication of hands. This clutch can be thrown either way at the discretion of the operator by means of a foot treadle.

The illustration shows the motor-driven machine, but also shows the belt pulley in position. In the belt-driven machine, the motor and supporting stand are omitted and also the gear train through the motor is connected to the belt pulley shaft. The belt-driven machine has a single speed, but it is customary to equip the motor-driven machine with a variable speed motor. It is unnecessary to fill the pipe before bending and the normal section is retained throughout the operation. Sixteen completed bends have been made within ten minutes and on daily runs 300 bends have been made in nine hours on a number of occasions. These bends were 180-degree return bends of 2-inch pipe made to a 4-inch radius, the length of the legs being 5 or 6 feet. The machine is intended principally for manufacturing duties. It is a special machine and when set up for a single piece of work would be used on that job for a considerable time.

A NEW WATER TOOL-GRINDER.

The accompanying illustration shows a 20-inch water tool-grinder recently placed on the market by the Ransom Mfg. Co., Oshkosh, Wis. The water

FIG. 1.—RANSOM WATER TOOL GRINDER.

is retained in a large compartment in the water tank from which it is forced out by means of a blower shown in Fig. 2. In connection with the blower there is no packing and no wearing surfaces below the water line.

Water is conveyed from the blower to the emery wheel by means of a rubber hose. The hood or guard around the wheel is so constructed that all the water is brought to the

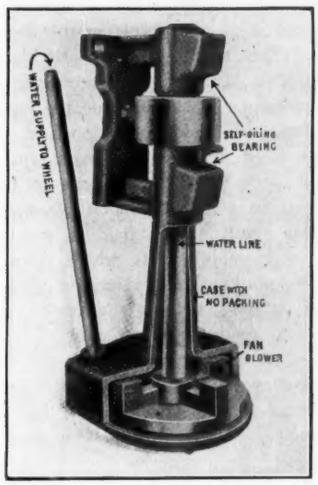


FIG. 2.—BLOWER FOR RANSOM TOOL GRINDER.

exact spot where it is required in grinding, and the tool rest is perforated, so that the water passes through it instead of striking the rest and being spattered over the machine. On account of the peculiar construction

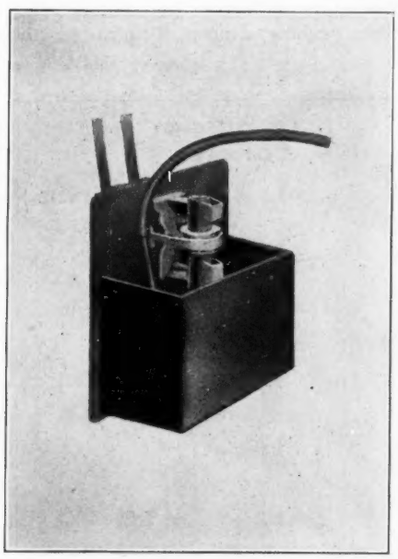


FIG. 3.—WATER POCKET ON RANSOM TOOL GRINDER.

of this rest, a large bowl to catch the water is unnecessary. After passing through the rest, the water flows into the settling pan, which is the smaller compartment of the water tank, whence it flows over the partition in the tank to the larger compartment. This facilitates cleaning, the sediment all being deposited in one compartment. The large plate shown on the side of the machine forms one side of the water tank, which extends into the frame of the machine and contains the water, blower and settling pan. It can be easily removed and cleaned with a shovel, and holds enough water to last several weeks. The supply of water is regulated by the valve shown at the back of the machine and no water is on the wheel expect when running. The idler pulleys are so arranged that they may be used as belt tighteners. The arbors of the machine are made of 0.50 carbon open-hearth steel and all shafts, both in machine and countershaft, are accurately ground and run in self-oiling boxes. The size of the wheel is 20 x 1½ inches. The arbor is 1 9-16 inches diameter and carries a pulley 6 x 4½ inches. The floor space occupied is 20 x 30 inches and the machine complete weighs about 800 pounds. A feature of the machine is that the emery wheel dresser can be attached without removing the tool rests.

SPECIFICATIONS FOR STEEL SPRINGS.

At the recent meeting of the American Society for Testing Materials, the committee on testing and tempering of springs reported progress and submitted the following tentative specifications:

Process of Manufacture.

1. Steel for springs may be made by the open-hearth and crucible process.

Chemical Properties.

2. There will be two classes of spring steel, which shall conform to the following limits in chemical composition:

	Elliptic and semi-elliptic	Coil.
Carbon	0.90 to 1.10 per cent	not under 0.90 per cent
Manganese shall not exceed	0.50 per cent	0.50 per cent
Phosphorus shall not exceed	0.05 per cent	0.05 per cent
Sulphur shall not exceed	0.05 per cent	0.05 per cent

Bands will be made of wrought iron to American Society for Testing Materials requirements.

Test Pieces and Method of Testing.

3. At least 25 per cent of each lot of shipment of springs selected at random, will be submitted to the following test:

4. (A) Springs, with ends of semi-elliptics supported on swinging or roller bearings, must not be less than nor more than ⅜ inch over specified height under "Applied" specified load, and must not take permanent set when free.

4. (B) Springs, with ends of semi-elliptics supported on swinging or roller bearings when released from one and one-half times specified load, must not be higher nor more than ⅜ inch lower than specified height, and must not take permanent set when free.

Finish.

5. Plates must fit closely together at all times and deflect uniformly under test loads.

6. Plates must be free from lamination and other defects and must not vary from card more than 0.03 inch in width, not more than 0.02 inch in thickness.

7. Bands must not vary from card more than ⅛ inch in width and 1-16 inch in thickness and must be free from injurious flaws and defects.

8. Length from center to center under specified load must not vary more than ¼ inch from card.

Marking.

9. Each spring must be stamped on one side of band with maker's mark, and date made. (Month and Year.)

Inspection.

10. The inspector representing the purchaser shall have all reasonable facilities afforded to him by the manufacturer to satisfy him that the finished material is furnished in accordance with these specifications. All tests and inspections shall be made at the place of manufacturer, prior to shipment.

A PROCESS OF AGGLOMERATING PULVERULENT IRON ORES.

A patent on a process of agglomerating pulverulent iron ores has been granted to Wilhelm Schumacher, of Oberdollendorf, Prussia.

Very finely ground quartz or flint is mixed with pure finely-ground oxide of lime or hydrate of lime, preferably in equal parts. The proportions can be varied, but as limestone usually has to be added to blast furnace charges, the percentage of lime in the mixture can be kept high. With this compound is mixed, together with the addition of the necessary moisture, the ore or blast furnace dust to be agglomerated. An admixture of about five per cent of quartz-lime is generally sufficient; the exact percentage, of course, is dependent upon the chemical and physical nature of the ore powder. The briquets are then hardened by subjecting them to the action of steam under pressure in a closed vessel. In some cases, when the ore to be agglomerated is finely subdivided, it is advisable to convert the quartz-lime mixture partially into colloidal calcium silicate before mixing with the ore.

A NEW UNIVERSAL AND SPIRAL HEAD FOR THE MILLING MACHINE

The accompanying illustrations show the various features of a new universal index and spiral head for milling machines designed by the Becker-Brainard Milling-Machine Co., Hyde Park, Mass., for attachment to its line of universal milling machines. This head possesses a number of points of special interest, among them being its stiff and rigid construction; the large worm and worm wheel of coarse pitch; the arrangement by which differential indexing may be accomplished regardless of the head's position on the machine platen; the arrangement by which differential indexing may be accomplished on other than plain cylindrical work, as on bevel gears; the arrangement by which differential indexing may be accomplished on work with helical grooves, as spiral gears; and the arrangement by which the spindle and work may be rotated independent of the lead screw when the change gears are set for spiral milling, making the setting of the work much easier than it would otherwise be, together with the adjustable clutch for facilitating the above operation. The index crank is provided with a handle for rotating it, separate from the index pin. This gives a crank of the same throw, regardless of the position of the index pin and eliminates all danger of the pin dropping on the plate while revolving the crank. The machine has a single reversible index plate for all divisions and an adjustable dial on the spindle nose for obtaining angular divisions in degrees for work requiring no great accuracy. Means are also provided for taking up wear in the worm gear or dividing wheel.

The head is the result of the desire to fill the need of a spiral head that will answer the requirements of the heavier duty now imposed on the milling machine and still retain the fine points of accuracy expected from this tool. In the design of the head, the object has been to produce a design answering the requirements of the wide range of work met with in ordinary practice without sacrificing any of the desirable features of the older heads, and to add those features which good practice has shown will greatly increase the usefulness of the head on general work. The worm gear is made in two sections, so that one section may be rotated on the other to take up the wear on the teeth. This method is not new but is the most accurate method of adjusting for wear and also in the hobbing of the teeth of the blank. This division in the worm is plainly shown in the illustration, Fig. 3. The stiffness developed in the construction of the head is plainly visible in the illustrations. The increase in strength has not impaired in the slightest degree the ease of handling, nor has it made the head at all clumsy or awkward to operate. The design is of the most approved type, the swivel block being housed between heavy uprights in which the block swings in a vertical plane, and is held in any position by clamping bolts which draw the outside plates securely against the uprights, securely binding the head in position against the heaviest cuts.

The feature of the design to which the maker calls particular attention is the large worm wheel, which has been obtained. This gear has been made as large as the respective swing of each size head will allow, and by the design followed it has been made larger than is usually found in milling machine heads. The size of this wheel is plainly shown in the illustration, Fig. 3, in which the back plate is removed. The large diameter adds to the life of the wheel and insures greater accuracy in the work than is possible with a smaller diameter. In addition to this accuracy, the large diameter and the resulting coarse pitch allow of much heavier spiral cuts being taken without danger of impairing the

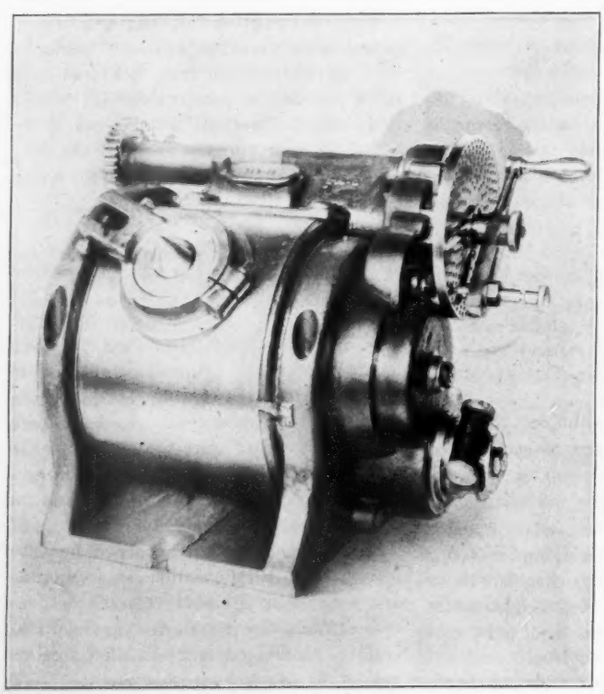


FIG. 1.—UNIVERSAL AND SPIRAL HEAD, ELEVATED.

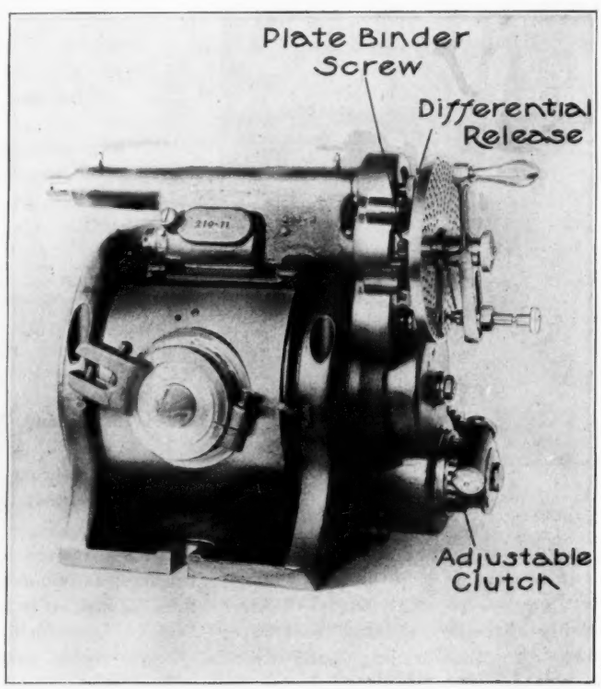


FIG. 2.—UNIVERSAL AND SPIRAL HEAD, SHOWING UNIVERSAL CLUTCH AND DIFFERENTIAL RELEASE.

accuracy or of distorting the teeth in the gear, and the increase in stiffness of the head makes possible the taking of much heavier cuts at high feeds and speeds, insuring good results with high speed steel tools.

The idea of making the differential indexing mechanism a component part of the head has been carried out so that the head may be used as an indexing or dividing head in any position along the platen with the spindle either parallel or at right angles to the main spindle of the machine, or in any intermediate position. This result has been accomplished by placing the change gears used in differential indexing on the rear of the head. This is shown in the illustration, Fig. 4. The gears have no connection with the table, which is the case with the ordinary index head fitted for differential indexing. With the gears used in differential indexing on the head, as shown, it is possible to swing the spindle into position for cutting bevel gears or teeth on any conical work. This broadens the scope of differential indexing from cylindrical work to that which requires the angular setting of the spindle in the vertical plane.

In order that the application of differential indexing may be universal, it is necessary to make it available for use on work with helical or spiral grooves. This has been done in the head illustrated as follows: The principle on which the differential system of indexing works makes it necessary to have the spindle and index plate so connected by means of change gearing that the movement of the spindle will cause a movement of the index plate in one direction or the other, as the case may be. This makes it necessary that the index plate be free to move on its axis independent of the index crank during the indexing operation. In cutting spirals, the plate is geared to the lead screw by suitable change gears. The connection between the lead screw and the index plate must be broken when making the division, in order that the index plate may be free to make the differential movement with the index crank. The connection is broken in this case by means of the adjustable clutch shown in Figs. 2 and 5, which is withdrawn during the indexing operation. After the division has been made, the teeth in the clutch will be found in such a position in relation to the corresponding spaces that it is impossible to engage them, and in order to bring the teeth

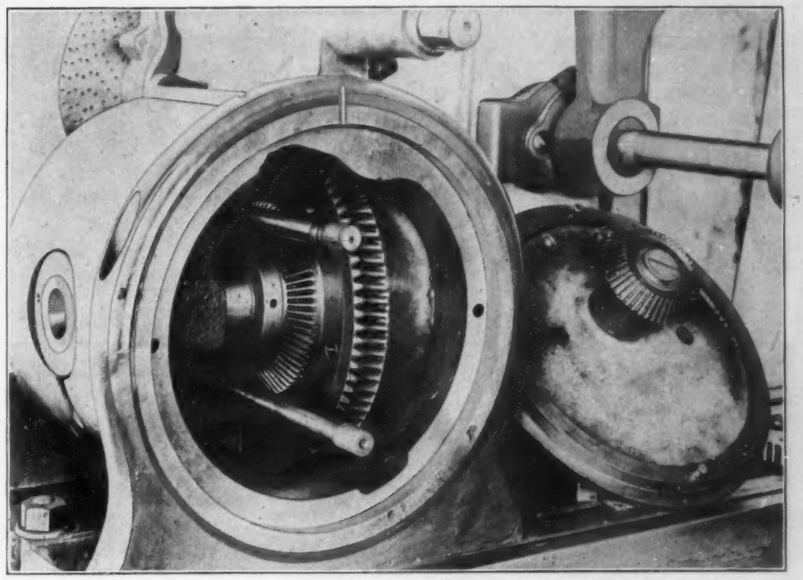


FIG. 3.—WORM AND WORM WHEEL OF UNIVERSAL AND SPIRAL HEAD.

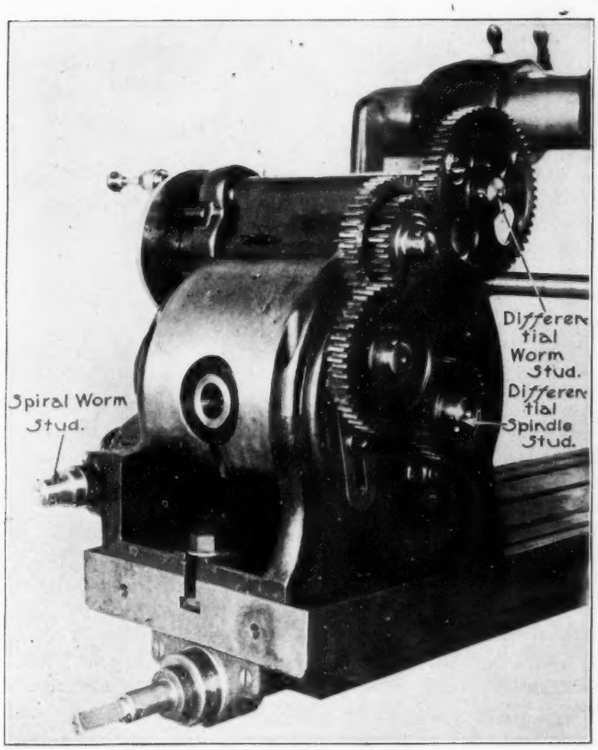


FIG. 4.—GEARS ON BACK OF HEAD FOR DIFFERENTIAL INDEXING.

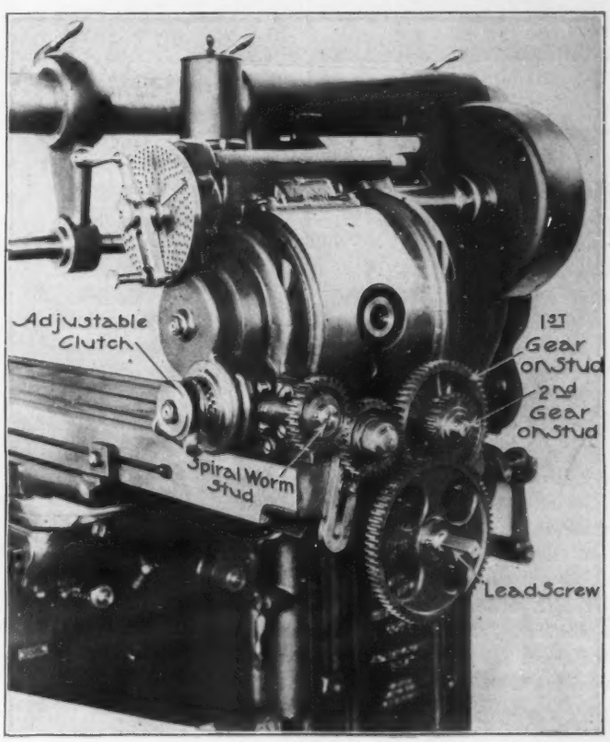


FIG. 5.—UNIVERSAL AND SPIRAL HEAD GEARED FOR CUTTING SPIRALS.

and the spaces opposite each other, one-half of the clutch is made adjustable so that it may be rotated the required amount to bring the two portions in proper position for engagement. The adjustment is made by means of the knurled knobs attached to the clutch.

The connection between the index crank through the worm gear and spindle and change gears of the differential indexing mechanism and the index plate, when the index pin is in mesh with a hole in the plate, forms a locked train, which must be released during the spiral cutting operation. This release is accomplished by means of the knurled knob back of the index plate which operates a friction clutch.

Frequently it is desired to roll the work on its axis without shifting the dog or losing the position of the index pin, or the amount of roll over may be so that, should it be accomplished by rotating the crank, the pin will not come exactly over a hole, as is necessary. Should it be attempted to move both plate and crank in conjunction, it would be found that the back pin of the ordinary head would not engage with a back hole. In the head under discussion, the back pin is eliminated and the plate held in position when resorting to plain indexing by a frictional hold on the hub of the plate gear, which is clamped or released by a suitable bolt conveniently located, as shown in Fig. 2. By this means, work may be set regardless of the position of the plate and the plate can then be securely held in the position it takes when the work is set. All who have used the ordinary head will note the advantage gained in the elimination of the back pin and substituting a more flexible holding device, as is here illustrated.

In work requiring the head to be connected for spiral cutting, the roll over of work is made more convenient by the presence of the adjustable clutch, which, as explained above, allows the disconnection of the spiral cutting train, so that the spindle and work may be revolved or rolled over without changing the position in relation to the cutter in a direction parallel to the feed motion.

Furnace Contract Awarded.—The Variety Iron Works, Cleveland, has been awarded the contract for the plate work for the new No. 2 furnace to be erected at Cleveland by the Cleveland Furnace Co. There are about 800 tons of steel in the contract which will be furnished by the Jones & Laughlin Steel Co. The Mesta Machine Co., Pittsburg, has secured the contract for the blowing engines for the new stack.

A NEW MECHANICAL STOKER OF THE STREWING TYPE.

A new mechanical stoker planned along unusual lines and for which many advantages are claimed over the ordinary type of continuous-feed stoker, is being placed on the market by the Sarco Fuel Saving & Engineering Co., 90 West street, New York. It is designed by John A. Caldwell, general manager of the company, and is known as the Caldwell automatic mechanical shovel or shovel stoker.

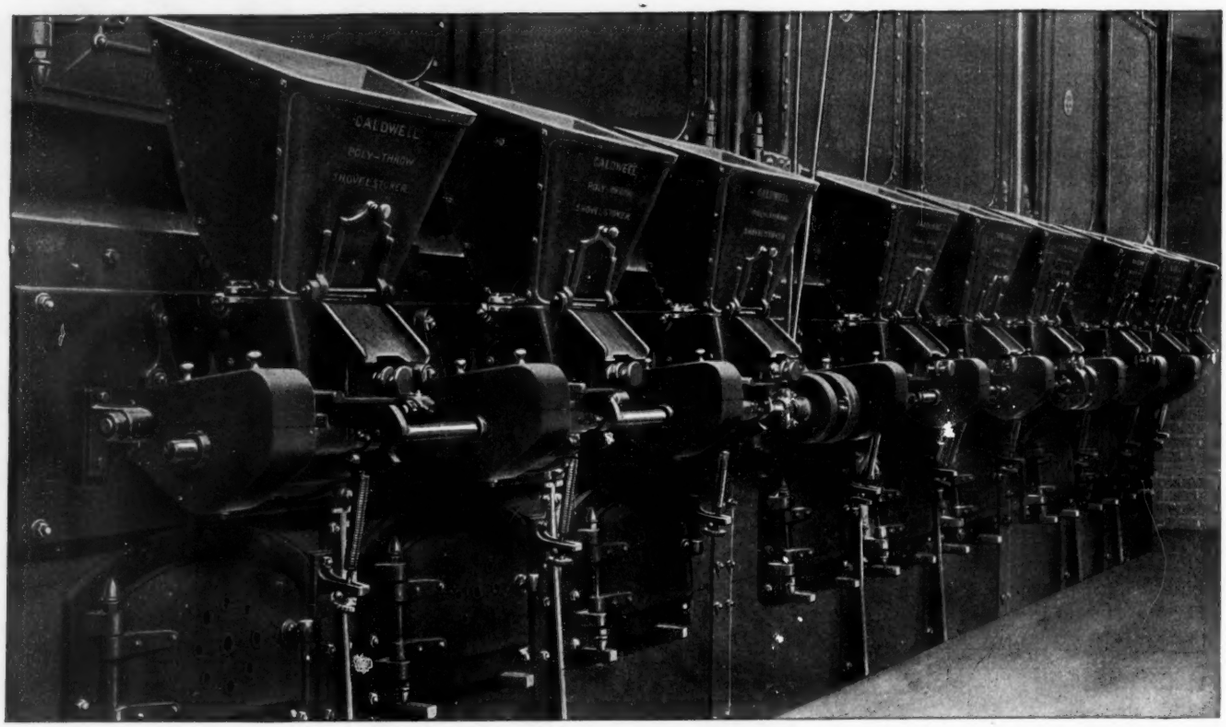


FIG. 1.—BATTERY OF BOILERS EQUIPPED WITH CALDWELL STOKERS.

This mechanical shovel differs radically from the usual type of stoker in that it is located entirely outside the furnace, being attached to a horizontal support bolted to the wall immediately above the fire doors. Its hoppers are conveniently placed for receiving coal from above, and except for this it is remarkably compact and requires but little space. One of the first installations of nine shovels is shown in Fig. 1, which illustrates its outward appearance. Its working parts are all enclosed, as security against dust and dirt.

In Fig. 2 is shown a cross section of the device, the operations of which are here apparent. Coal from the hopper falls to a small table, from

which a small charge of coal B is deposited by a reciprocating ram A in front of a pendulous shovel C, the lower edge of which swings close to a curved pan D. This shovel is drawn back by a cam and tappet to a point of release, from which it is swung swiftly forward by a strong helical spring E, this action projecting the charge of coal lengthwise to a predetermined point on the grate. At each throw a simple mechanism imparts to the spring a stronger degree of tension, the result of which is to deposit the coal at a correspondingly further distance upon the grate. Perfect precision and smoothness in changing the degree of tension are automatically secured and any length of grate can be uniformly supplied with fuel, by allowing one shovel to about each three feet width of furnace.

The discriminating feature of this device lies in the fact that it is of what has been termed the "strewing" type of stoker; it mechanically strews the coal across the grates somewhat after the manner of hand-firing. This strewing, however, is constant and gradual. With hand-firing, a 600-horsepower boiler would call for five coal-charges hourly of about 360 pounds each. With the Caldwell shovel the average charge is so small (about five-eighths of a pound) that this amount of coal would be distributed over some 2,800 charges. This constant firing, with fire doors always closed, results in the entire grate surface being effective all the time, as it is completely covered with incandescent fuel and a steady supply of "over air" is easily provided.

Other ill-effects of the hand-firing of large masses of green coal at wide intervals, which this shovel was designed to avoid, include the reduction of furnace temperature whenever a large amount of raw coal is introduced, with the sudden and extensive emission of volatile gases and consequently an imperative demand for large volumes of air, at the furnace temperature, within the furnace. The meeting of this demand, it is well known, is rendered impossible at the time by the very act of firing, and a heavy emission of smoke results. As the fire-bed becomes open and free, owing to the reduction of gases, hand-firing also encounters the problem of dealing with a constantly increasing and unregulated supply of cold air at the very time when economy would dictate a constantly diminishing supply. Steady, gradual firing, such as this shovel provides, of course obviates this difficulty.

The Caldwell device allows the use of any type of grate, will handle even the smallest coals and produces a minimum of smoke. It can easily be extended and, as it calls for no change in the doors from hand-firing, permits of quick access to the grate surfaces.

The Pennsylvania Railroad Co. has appropriated a large sum of money for railroad shops, round house, power plant and coaling station to be erected at the Conway yards, 15 miles west of Allegheny on the Fort Wayne road. The round house will have 42 stalls.

The copper production in the United States during 1906 reached a total of 906,591,947 pounds. This is an increase of about 18,000,000 pounds, or 2 per cent over the production of 1905, the total refined copper output being 882,568,237 pounds. The total spelter production in tons of 2,000 pounds was 224,770 tons. This is an increase over 1905 of 20,921 tons.

A MACHINE FOR FACILITATING COAL STORAGE.

The Hamilton Mfg. Co., Columbus, Ohio, has developed a machine for handling coal and coke into and out of storage that is claimed to answer the objections against first cost and flexibility that are commonly brought against storage systems for bituminous coals. Some of the objections to the general storage of soft coal are that the material itself is not benefited by rehandling and it will not stand an open air exposure for any continued time, as it tends to either slack or catch fire. The cost of an installation requiring elaborate structural work is very great and this same structural work limits the capacity of the yard, which should be elastic. Interest on the investment and the charge for depreciation, in addition to the cost of operation, frequently makes the first step in the direction of central coal storage unattractive. To overcome these objections a system is necessary in which the coal can be handled into and out of storage without delay and in large

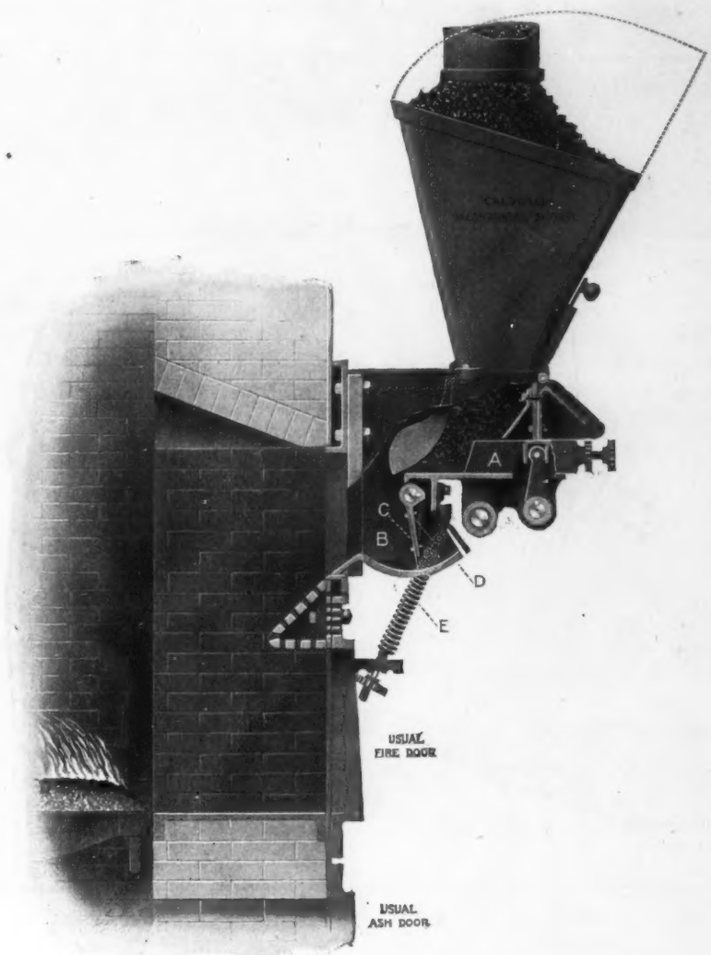


FIG. 2.—THE CALDWELL MECHANICAL STOKER.

quantities. This system must also have a low initial cost. Although the need for and the use of coal as fuel is practically a constant quantity, the demand is extremely irregular. This necessitates an efficient storage system if mines are to be kept in operation continuously.

The United States Steel Corporation will shortly install in its storage yard at the new Gary plant one of the machines brought out by the Hamilton Mfg. Co. and shown in the illustration, Fig. 1, for handling coal and coke into and out of storage. This machine takes up loose material from any desired part of a storage yard 100 feet wide and of any desired length. It is capable of stocking the material to a height of 40 feet and reloading it from the stockpile into a railroad car when the material is to be moved. It has a capacity of six tons per minute on either operation.

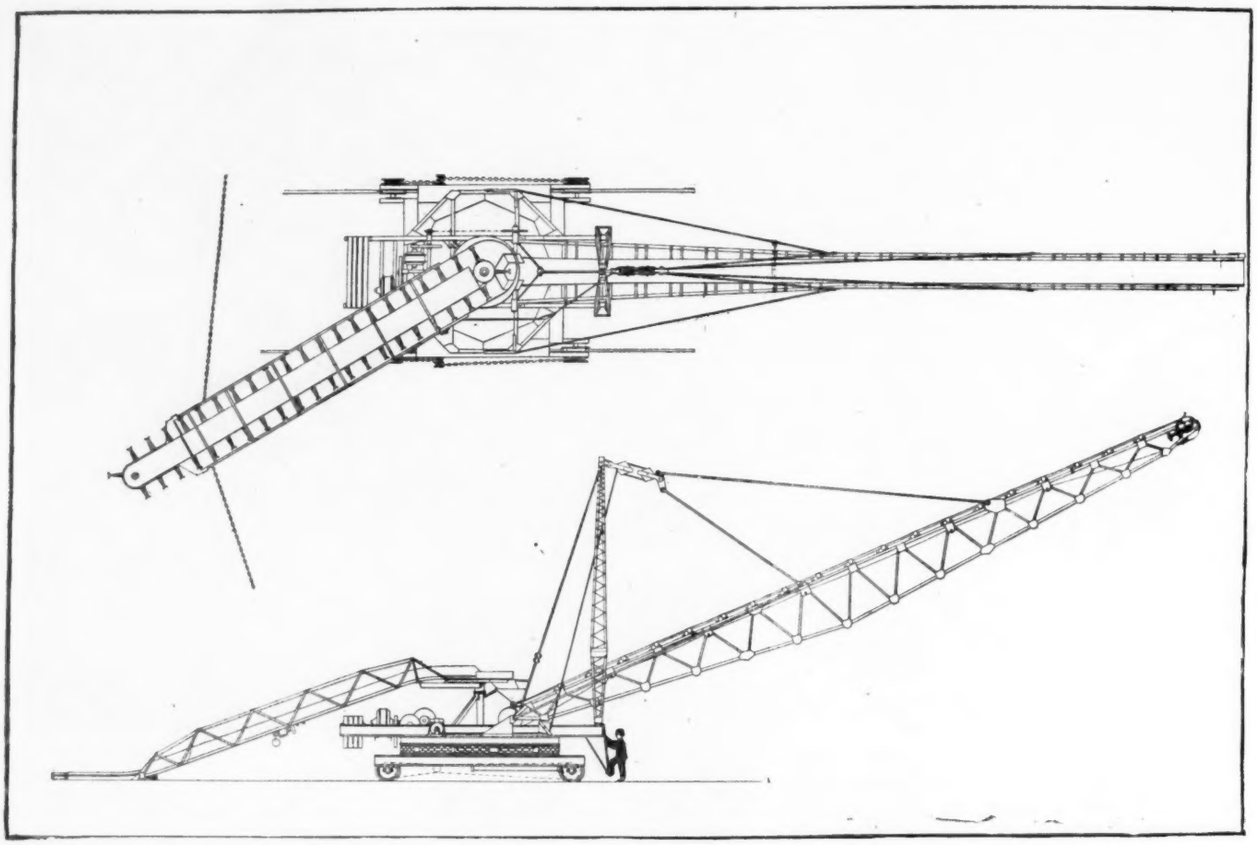


FIG. 1.—MACHINE FOR HANDLING AND REHANDLING COAL IN STORAGE. INSTALLED IN THE GARY PLANT OF THE UNITED STATES STEEL CORPORATION.

The cost of rehandling coal and coke with this machine is stated to be less than 2 cents per ton, and as no overhead work or other construction is required, excepting the platform and track on which it operates, the first cost and the cost of maintenance are low.

In operation the machine does not leave its 18-foot track. The radial sweep reaches out 50 feet from the vertical head shaft, while the flights of the conveyor take up and carry to the delivery conveyor all material lying in the path of the gathering plate.

The machine is moved backward and forward by its own power, and both gathering and delivery conveyors are capable of swinging in a circle about the machine center. Therefore, coal may be picked up from any point of the platform and delivered to any point within the limit of the delivery conveyor. These movements give the flexibility of operation to the machine, which is necessary where large amounts of material are to be handled quickly.

The machine as shown is a development of the pit-car loader made by the same company. The principles involved are identical, the dimensions, however, being widely different. The pit-car loader is required to work in highly restricted space, where the other machine has unlimited ground area in which to work. The pit-car loader, furthermore, has to pick up from the mine floor material that is massed and jammed into a close pile. This machine, which is illustrated in Fig. 2, occupies only 42 inches headroom and works in 48-inch veins. It mechanically picks up and loads run-of-mine coal at the rate of 1,000 pounds per minute.

After the coal has been undercut by any of the undercutting machines in common use and the coal has been drilled and shot down, the loading machine, which is self-propelled, moves into the room. The pony truck carrying the front end is removed and the posts for the feed chain are set up on each side of the room. The nose of the machine then rests on the floor at the edge of the coal and the pit-car to be loaded is placed under the delivery conveyor. The switch is moved from left to right and from right to left across the room, and the gathering flights, not shown in the illustration, pick up the coal which gathers on the nose plate and convey it to the steel belt conveyor, which delivers it into the car. To show the increase in capacity of the conveyor method of loading over shovels or scoops and grab buckets, when the pile is 5 feet high 7 feet of coal will fall into the machine for each square foot of floor space traversed by the sweep. The coal rolls down into the path of the gathering nose, the breakage being reduced to a minimum. When

the nose is 4 feet long, the sweep need not move faster than 2 feet per minute across the floor to enable the machine to gather and load one ton of coal per minute in a continuous stream.

When the cars are large and heavy, it is desirable to equip the pit-car loader with reels and rods to handle loaded cars and empties from the face of the room to the cross entry where they can be removed to the bottom of the shaft. The machine illustrated herewith is so equipped. These machines are built in capacities ranging from 1,000 to 12,000 pounds per minute, the latter size being used for storage and rehandling.

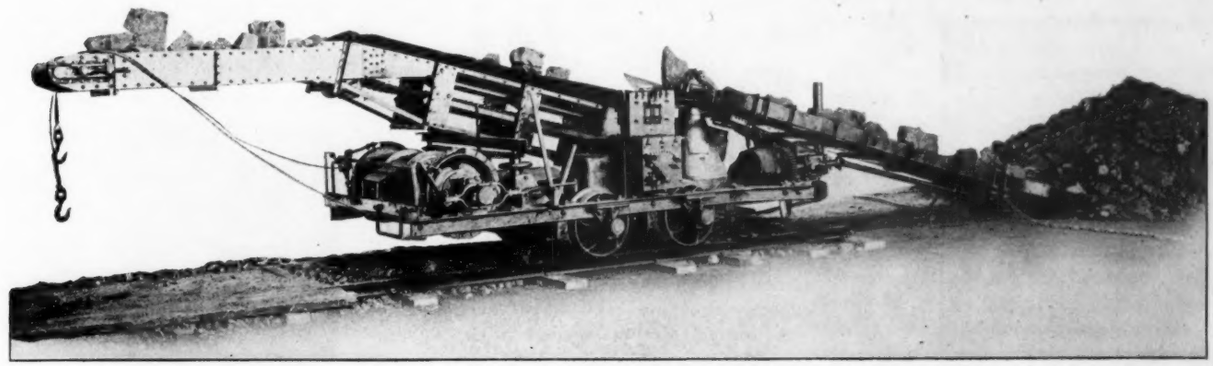


FIG. 2.—THE HAMILTON PIT CAR LOADER.

The Yetman Typewriter Transmitter Co., at present located in Ilion, N. Y., is to establish a plant at North Adams, Mass. It is capitalized at $1,000,000, with $875,000 paid in. Heretofore the machine has been made under contract. The new plant is expected to be in operation in 60 days. The president of the company is Samuel Johnston of New York; vice president and general manager, Chas. E. Yetman, Ilion, N. Y.; directors, the above with R. H. Sears, who is also the mechanical adviser of the company, T. H. Mack of New York, and Gabriel Morton of New York, Johnson, Yetman and Sears will reside in North Adams. Mr. Yetman, the inventor of the typewriter, was a telegrapher. The machine may be operated as an ordinary typewriter, or used to transmit a telegram over the wire. By touching the keys Morse signals may be transmitted which are absolutely perfect. The device is already in use in many large railroads. About 200 hands will be employed.

The Pacific Iron Works of Spokane will build an addition to its plant at Post street and Broadway to cost $3,000. A. G. Bergholtz is architect.

WESTERN FOUNDRY SUPPLY CO. EXPANDS.

The Western Foundry Supply Co. of East St. Louis, Ill., has outgrown its home at East St. Louis and just completed a new plant at Elizabethport, N. J., shown in the accompanying illustration. This company has recently purchased the ground ferro-manganese business of Crocker Bros. of New York, and has opened an office in the Phelps-Dodge building, known as 99 John street.

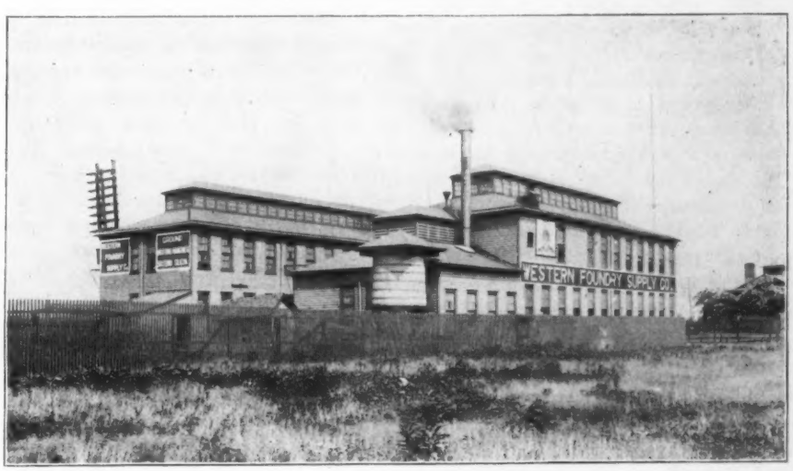
It grinds a general line of foundry facings, alloys and refractories at East St. Louis, consisting of plumbago, lead, talc, graphite, sea-coal, 80 per cent ferro-manganese, 50 per cent ferro-silicon, ferro-chrome, manganese oxide, fire clay, silica, oxide of chromium, etc.

The consumption of ferro-alloys among gray iron foundries has increased so rapidly, however, that the plant at Elizabethport, which has a capacity of 50 tons per day, will be devoted exclusively to the grinding of 80 per cent ferro-manganese, ferro-silicon and manganese oxide.

The East St. Louis plant, which is really two plants with a power house between the two, is equipped with a 250-horsepower boiler, two 100-horsepower engines, three rock emery mills, three buhr mills, two rotary crushers, two roll jaw crushers, an impact pulverizer, two special mills for grinding metallic alloys and six 14-foot bolting reels.

The Elizabethport plant is equipped with a 150-horsepower boiler, 100-horsepower engine, two roll jaw crushers, two impact pulverizers, two mills and a duplicate set of screens.

W. G. Nixon, of St. Louis, formerly purchasing agent of the Missouri Pacific railways, is in charge of the East St. Louis plant and J. A. Rogers, formerly of St. Louis, is in charge of the New York office and the Elizabethport plant, which began grinding July 4, 1907.



THE ELIZABETHPORT PLANT OF THE WESTERN FOUNDRY & SUPPLY CO.

Having two plants, puts this company in an excellent position to make prompt delivery of ferro-alloys to any part of the United States.

A strike is reported on the part of about one thousand Moors employed at iron mines in Algeria.

A CONTINUOUS CUPOLA TUYERE SYSTEM.

A CUPOLA tuyere system designed for the introduction of a large volume of air into a furnace at a low pressure, thereby insuring a low melting point, and uniform operating conditions, has been designed by J. C. Knoeppel, 577 East Ferry street, Buffalo, N. Y., for which patents are pending in both the United States and Canada. The inventor has had more than 20 years experience as a foundry manager and has devoted considerable time to the study of melting problems.

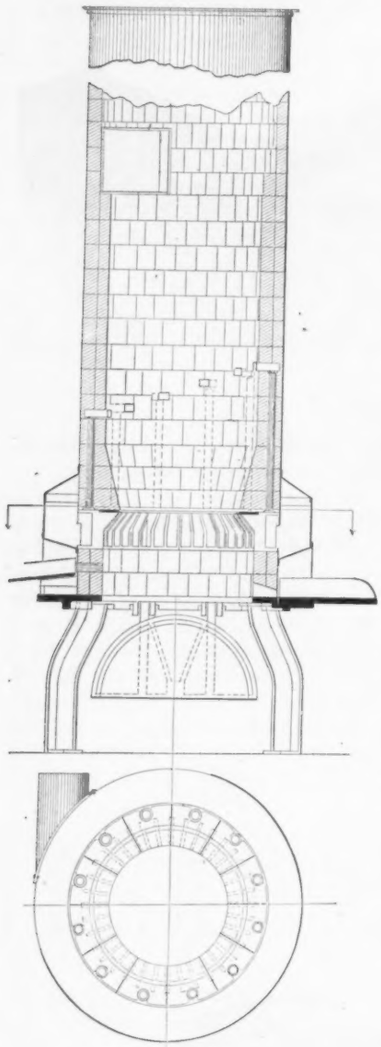


FIG. 1—SECTION OF CUPOLA EQUIPPED WITH KNOEPPEL TUYERES

The fundamental principle underlying good cupola work is the introduction of the required amount of oxygen into the cupola in such a manner as to procure an even temperature throughout its circumference, thereby avoiding cold spots. To accomplish this, the blast should be uniformly distributed and the tuyere area should be as large as possible. If the cupola lining is allowed to take its own course, it will be found that it will build out slightly above the tuyeres and form a bosh over them. Recognizing the advantages to be derived from large openings in the delivery of air at the lowest possible pressure, so as to avoid irregularity in melting, the tuyeres have been arranged as shown in Figs. 1 and 2. The castings composing the tuyeres are in segments and form a continuous belt around the cupola. In large furnaces, the upper and lower portions of the tuyeres are made in two sections, while for cupolas of smaller capacity they are cast in one section.

A vertical section through a cupola equipped with the Knoeppel tuyere system is shown in Fig. 1, and at A in Fig. 3 is shown one of the tuyeres provided with a safety notch in the center so that when the iron rises to this point it will flow through this depression and escape through a soft metal plate, thus warning the melter before the iron flows into the tuyeres proper. At B, Fig. 3, is shown one of the key tuyeres. Its upper flange overhangs the adjacent tuyeres, while the lower portion is made with parallel sides so that it can be drawn into the center of the cupola, thus releasing the other tuyere blocks. The tuyere blocks above the spout and over the slag hole usually have their lower tier of openings stopped with brick to avoid any liability of chilling the outflowing slag or metal.

One of the most important features in connection with this system is that it may be said to have practically two independent wind belts which give the air an opportunity to equalize in pressure both inside and outside of the shell, thus insuring equal pressure at each of the tuyere openings. The outside wind belt is a metal casing, as in the better style of cupola mountings, while the inside belt is formed by cutting back the vertical partitions of the tuyere blocks at the side next the cupola shell, as shown in Figs. 4 and 5. A series of openings through the shell admits air to the back of the tuyere blocks and it then flows through the inside air space. By making the tuyere area ample, the air flows at a relatively slow velocity and has an opportunity to lag or rest in the tuyeres for a short time, thus enabling it to take up some of the heat and to enter the cupola or furnace in the best possible condition for rapid combustion. The overhanging upper edge of the tuyere blocks effectually prevents the slag or metal in its downward course from flowing into the tuyeres and blocking them. It also prevents the coke from falling into the tuyeres and closing them, thus insuring an ample opening at all times during the heat. In the ordinary cupola construction the lining is carried up vertically for a short distance above the tuyere blocks and is then flared outward, forming the bosh. The brick lining is supported by angle irons riveted to the shell as usual, so that the tuyeres can be removed if necessary should any change in their arrangement be required.

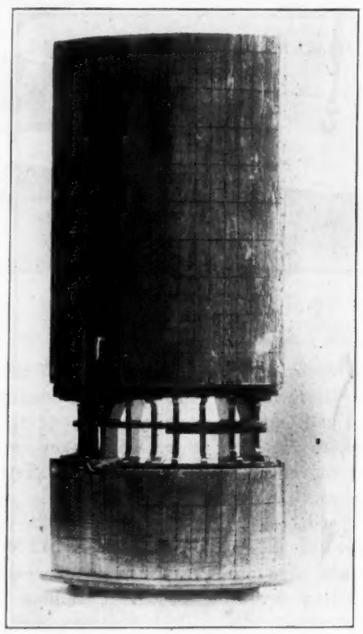


FIG. 2—VIEW OF VERTICAL PIPE IN CUPOLA LINING

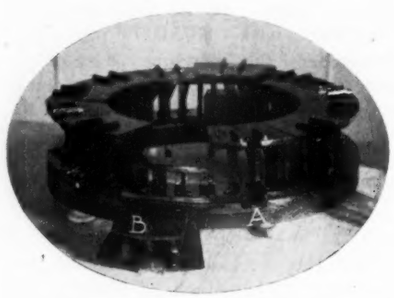


FIG. 3—TYPES OF TUYERES

Another feature provides for the introduction of air above the melting point, with a view to the utilization of the heat contained in the gases to its fullest extent. These openings are arranged by providing notches in the top of the tuyere blocks which connect with vertical pipes next to the one on the inside of the cupola.

These are provided with nozzles leading through the lining shown in Figs. 4 and 5. The nozzles are secured to the pipes with dovetail joints, so that they can be easily replaced. While melting, a small amount of air is admitted to the cupola through these vertical pipes and combines with the carbonic oxide gas. The heat thus set free is to a considerable extent absorbed by the material as it settles toward the melting point in the cupola, thus preparing the metal for more rapid melting. These vertical pipes can be closed with dampers or valves which can be adjusted to regulate the amount of air to be admitted. The method of setting these vertical pipes in the cupola lining is shown in Fig. 2. At the close of the heat, the dampers in the vertical pipes can be opened wide and the volume of air thus admitted aids materially in effecting a rapid cooling of the lining. In small cupolas the amount of the tuyere overhang on the inside is necessarily reduced, and possibly in some cases it would be entirely eliminated, and flush or vertical tuyeres be used. Cast iron plates have been provided for these vertical tuyeres which can be set over the tuyeres to form an overhang of from one to two inches, thus providing a small amount of boshing.

The principal advantages claimed for this system are as follows:

First—The introduction of a large amount of air at a low pressure, insuring a low melting point and uniform operating conditions.

Second—By the use of the overhanging upper portion of the tuyeres the liability of their stoppage is greatly reduced, permitting longer heats to be taken from the cupola.

Third—The inside wind belt insures a thorough equalization of the blast pressure and provides equal melting at all points around the circumference of the cupola, which cannot be fully attained when the tuyeres are not continuous, and the air supplied through only one wind belt.

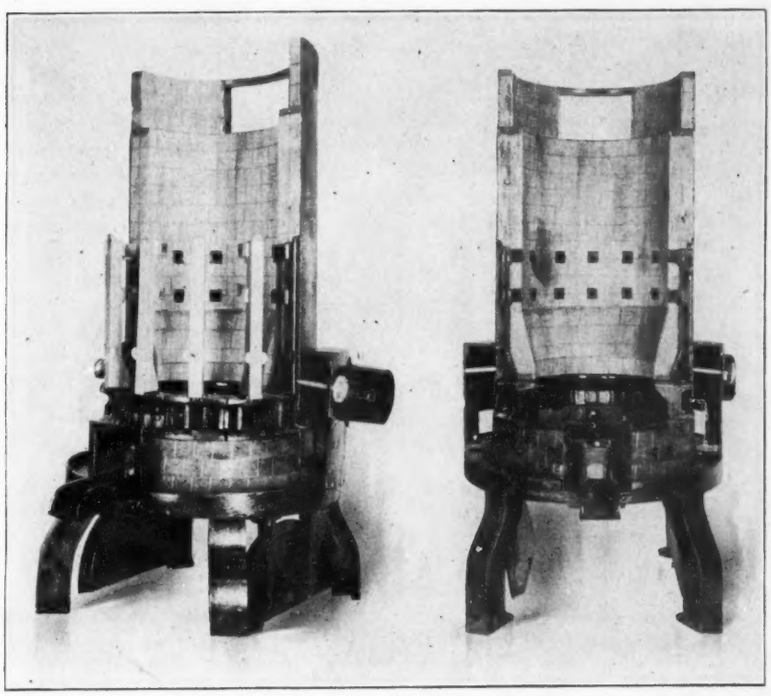
Fourth—The shape of the tuyeres, together with the use of the safety tuyere reduces the liability of stoppage caused by the metal rising in the tuyeres to a minimum.

Fifth—The vertical pipes with the supplementary openings into the cupola enable the operator to control the conditions above the melting point.

Sixth—The delivery of air much nearer the center of the cupola than where the tuyeres are flush with the lining. The tuyeres project from 2 to 7 inches into the cupola, reducing the diameter at the tuyeres from 4 to 14 inches, at the same time maintaining a large hearth below.

Seventh—The cupola can be relined to a smaller diameter without removing or disturbing the main tuyeres, a flexible or overhanging plate being provided which can be used in conjunction with the main tuyeres.

These tuyeres can be placed in any cupola now in use, and can be operated independently of the air supply pipes if desired.



FIGS. 4 AND 5—SECTIONS OF CUPOLA SHOWING VERTICAL PIPES AND CONTINUOUS TUYERE SYSTEM

A SPECIAL AIR COMPRESSOR FOR FOUNDRY USE.

The use of compressed air in a foundry for chipping, drilling, ramming, screening, sand-blast cleaning, etc., has attained large proportions, and economical production is greatly dependent, in many instances, upon it. Pneumatic chipping hammers, drills, etc., require air at not less than 80 pounds pressure at the tool for effective work, or say, 85 pounds pressure at the compressor. This assumes that the air lines are properly designed and of ample size. The pressure required for sand-blast apparatus, however, is much lower than this, being from 10 to 15 pounds for brass and stove castings, 15 to 20 pounds for medium and heavy gray iron castings, and 30 pounds for steel castings. Higher pressures, which have been used, have been found to break the particles of sand as they impinge against the casting, instead of cuting the hardened sand from the casting itself.

From the above, it is apparent that a high pressure and a low pressure air system should be provided for large foundries. This does not call for the installation of a duplicate set of pipe lines throughout the plant, since the sand blast work is usually localized in a special room provided for that purpose. The high pressure air, however, is likely to be required at any point in the foundry, and the lines must be carried throughout the works to permit the connection of tools, etc., where convenient and without the use of long hose lines.

To supply both high pressure and low pressure air, several methods may be pursued. The first is the installation of two separate single-stage compressors, one designed for supplying high pressure air, and of sufficient capacity to run the desired number of tools, riddles, etc., and the other for low pressure air and capable of supplying the sand-blast. This method, while entirely practical, presents the objectionable features of duplication of machinery, large floor space, etc. Furthermore, should either the high or low pressure requirements increase above the present capacity, the machine already installed must be replaced by a larger one. The second method is sometimes used in small foundries where the air required for

sand-blasting is but a small percentage of that required for tools, etc., utilizing a single high pressure machine, the sand-blast air being supplied from the receiver through a reducing valve which lowers the pressure to the desired point. This involves a loss of power, due to wiredrawing the air through the reducing valve.

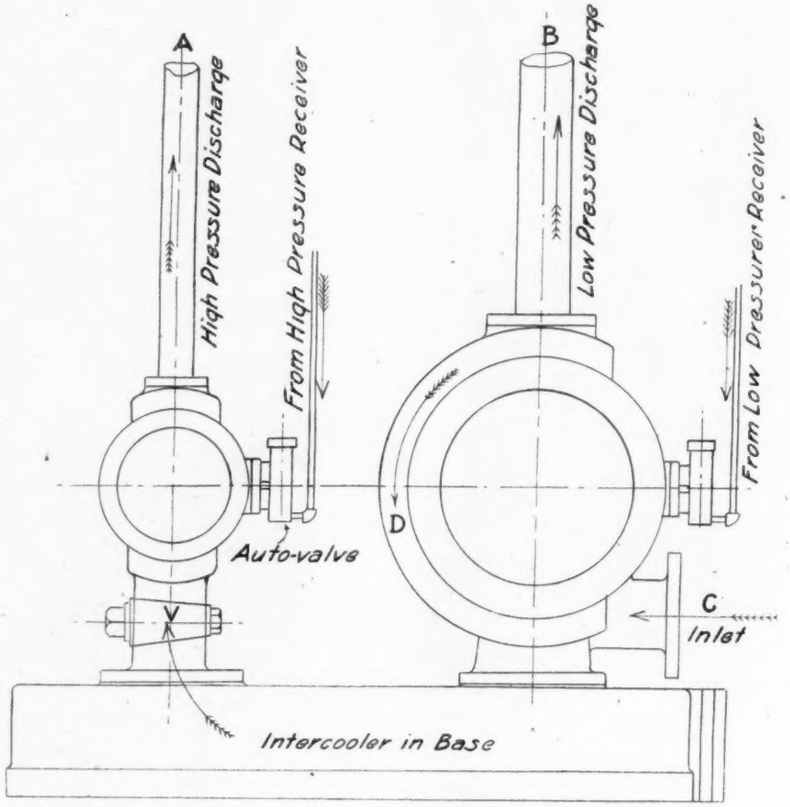
The accompanying drawing shows an arrangement devised especially for foundry service by the Bury Compressor Co., Erie, Pa., and which is particularly adapted to work of the character outlined above. The machine is built in various sizes and consists of a standard two-stage compressor, built by this company and which is provided with a high pressure cylinder with a special valve by means of which the cylinder capacity may be varied.

A discharge pipe is carried from the top of each cylinder at A and B and connected to the high and low pressure receivers, respectively. The air inlet for the entire machine is at C, and the air for the high pressure cylinder is compressed in the low pressure cylinder to sand-blast pressure, from 15 to 30 pounds depending on the character of the work done in the foundry. From the low pressure cylinder, it passes through the passage D cast around the cylinder and enters the intercooler cast in the subbase, where it is cooled to approximately atmospheric temperature before it enters the high pressure cylinder. The high pressure air is thus compressed in two-stages, resulting in a saving of about 12 per cent in power required over that necessary when compressing the same amount of air in a single stage compressor to 85 pounds per square inch.

The operation of the compressor is as follows: A specially designed automatic valve is attached to each air cylinder, the connection being made from the valve to its respective receiver by 1-inch pipe, as shown. When the compressor is operating and both high pressure and low pressure air is being used equal to the capacity of the machine, the automatic valves do not act. Should the demand for low pressure air cease, however, the pressure in the low pressure receiver will rise slightly and cause the automatic valve on this cylinder to raise the inlet valves and hold them open. No air will be compressed in this condition, it simply being drawn in from the atmosphere and rejected. In the meantime, the demand for high pressure air has been constant and the pressure in the intercooler and low pressure discharge piping will drop slightly and cause the same automatic valve to close the inlet valves and start compression, the air being supplied to the high pressure receiver exactly in proportion to the demand.

On the other hand, assume that both systems are using air up to the capacity of the machine and the requirement for the high pressure air ceases. In this case, the pressure in this receiver will increase slightly, causing the automatic valve on the high pressure cylinder to raise the inlet valves on that side of the machine. The compressor will now be supplying considerably more air than the low pressure system is using, so that the pressure on that system will increase and unload the machine, as before described, this automatic valve controlling the supply of low pressure in proportion to the demand.

The following advantages over other methods of supplying air at two different pressures are claimed by the manufacturer: A single machine only is necessary, requiring a minimum of floor space, piping, belting, attention, etc. This machine automatically supplies high pressure and low pressure air at exactly the amounts required. The entire capacity of the compressor is thrown into either the high pressure or low pressure systems as described, increasing the normal amount of air in either system by from 50 to 100 per cent. This is accomplished by manipulating the valve V. Substantially less power is required than when two separate machines are used, and the air delivered is drier, which is an important consideration in the operation of pneumatic tools.



THE BURY AIR COMPRESSOR FOR FOUNDRY USE.

An important change in the treasury department's regulations in regard to the drawback on imported pig iron has been made in the case of a lot of iron used by Adriance, Platt & Co., Poughkeepsie, N. Y., in the manufacture of agricultural machinery. The former decision made no allowance for wastage, but the amendment allows an addition of 5 per cent to the weight of the iron contained in the exported machinery to cover the loss in waste during the process of manufacture.

The National Machine Tool Builders' Association has arranged for its next meeting to be held Oct. 15 and 16. It will probably be in New York.

SALES IMPROVED

And General Conditions in Machine Tool Lines Are Favorable.

Office of THE IRON TRADE REVIEW,
Room 1005, No. 90 West St.,
New York, Sept. 3.

The machinery situation in the east has apparently made considerable improvement during the last week of August and the opening days of September. Current sales have been better and there is improved prospect for business during the fall. A representative of one of the largest machinery houses in New York, has just returned from an extensive trip through the central west. He is a man who keeps a very close watch on the trend of conditions and his observations were entirely favorable.

"New York," he said, "is the most pessimistic spot in the whole country today. All through the central west, where they are too busy caring for the crops to listen to the woes of Wall street, there is plenty of business going and the outlook generally is regarded as bright. Conditions are less tense than they were, it is true. Manufacturing plants are not operating at the frantic rate which prevailed for a time, but there is a very fair volume of good, healthy business, with more of it in sight. St. Louis, Chicago, Cincinnati and Detroit report very satisfactory sales for this time of year and a number of western railroads, which have been withholding purchases, will be ready with some attractive projects in about sixty days."

A considerable part of the equipment of the New Jersey Machine Co., mentioned in these columns a week ago, has been disposed of. The Vandyck-Churchill Co., New York, purchased 37 milling machines, two planers, a Landis grinder and a variety of miscellaneous tools. The equipment of the Providence Steel Casting Co., Providence, R. I., which is to be sold at trustee's sale Oct. 2, includes several small machine tools. The demand for second hand machines continues exceedingly good.

Considerable buying is being done just now by the Isthmian canal commission. Bids closed last week on a lot of miscellaneous equipment, including several locomotives. Purchases to be made at an early date include a number of additional steam shovels, an air compressor plant, rock drills, a tandem compound engine and generator and a lot of other varied supplies.

In the Philadelphia district, there is quite a bit of building activity. The Victor Talking Machine Co., Camden, N. J., has let the contract for putting up two large additional buildings to the J. S. Rodgers Co., Stanwicks, N. J. The Taylor Iron & Steel Co., High Bridge, N. J., has had plans prepared for three large structures. The Locust Realty Co. of Philadelphia, has let the contract to Moore & Co., of that city for a large reinforced concrete factory building, to cost $200,000 and to be occupied by the Heywood Bros. & Wakefield Co.

Some buying of tools is expected to result from the destruction by fire August 30 of the four-story structure of Snare & Triest, in Jersey City. In addition to this loss sustained by the bridge building, the early estimate of which is $150,000, the Manhattan Electrical Supply Co. plant adjacent was gutted and a large preserving plant and asphalt plant were destroyed.

LIGHTER BUSINESS

Coming to Worcester Machine Builders, but Many Orders Booked.

(Special Correspondence.)

Worcester, Mass., Sept. 3.—J. E. Snyder & Son, manufacturers of upright drills, have moved into their new factory, which provides means for increasing their output to a large extent and which they will take advantage of. J. E. Snyder says that while orders have slacked up somewhat of late weeks the company has orders ahead to keep it busy until March. About thirty per cent of their orders are foreign. Reports from other Worcester machinery manufacturers as to the state of trade is similar to the above. The tightness of money has not affected our machinery makers to any extent, although their customers feel the stringency as to collecting amounts due them. One manufacturer attributes the present slight lull in business to the policy of the president toward the trusts.

The plant of Wilcox, Crittenden & Co., manufacturers of marine hardware, Middletown, Conn., which was burned a few weeks ago, will be rebuilt. Contract has been awarded for a concrete building 60 x 200, one story; also a frame office and storage building.

The North & Judd Mfg. Co., New Britain, maker of saddlery hardware, has finished plans for an addition, the main building will be one story brick, 90 x 100, with two story wing 24 x 50.

The Union Mfg. Co. of New Britain, the well known chuck manufacturer, has also let contract for new factory buildings.

The Union Metallic Cartridge Co. has awarded the contract for the erection of an additional factory at its plant in Bridgeport, Conn. It will be one story, 84 x 102 feet, and used for general manufacturing.

A new paper box machine company is to be located in New Haven. Authorized capital is $500,000 and the concern will begin with $400,000 paid in. It will be known as the New England Paper Box Machine Co. The incorporators are Samuel Swift, New York, and William J. Smith and John N. Leonard, of New Haven.

Another new corporation is the Corbin-Church Co. of New Britain, with a capitalization of $25,000. The incorporators are Andrew F. Corbin, A. E. Church and George H. Corbin, all of New Britain. The company will manufacture machinery and hardware.

In the $12,000,000 rolling stock order recently placed by the N. Y. N. H. & H. R. R. Co., are one hundred coaches, to be built by the Bradley Car Works, Worcester. This order includes straight passenger, baggage and mail cars. Each will cost $10,000.

The Simplex Automobile Co. contemplated moving its plant from New York to Bridgeport, Conn., but owing to the unwillingness of a majority of its help to come to Bridgeport, the plan has been abandoned at least for the present. It makes the Simplex cars.

The Billings & Spencer Co., Hartfort, Conn., manufacturer of forgings, has begun the construction of a brick addition, three stories, 40 x 85 feet.

The Norwich, Conn., plant of the American Wood Working Machine Co., has been moved to Rochester, N. Y. The policy of the company is to concentrate its manufacturing operations, and many of the employes at Norwich have moved to Rochester. The Norwich plant was established in 1846, but was taken over by the combine in 1901.

Catalogs Desired.—The technology department of the Carnegie library of Pittsburg is making an extensive collection of trade catalogs, and will be glad to receive catalogs of any of the advertisers in THE IRON TRADE REVIEW. These catalogs will be given a prominent place on the shelves, carefully arranged under both firm name and subject, and made accessible to the public. Catalogs should be addressed care of H. W. Craver, technology department, Carnegie library, Pittsburg.

IMPROVED TONE

Noticeable in Cincinnati Machinery Market—Some New Shop Records.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg.,
Cincinnati, Sept. 3.

The tone of the machinery market is better. The feeling of unrest which was noticeable to some extent during the period of stock market and monetary disturbances has practically disappeared and shop proprietors are more inclined to regard the outlook with confidence. This has been stimulated by more orders coming in and but few cancellations being received. In our calls this week, we did not learn of a single cancellation. Considering the length of time some of the orders have been on the books, it is almost surprising that they could have been held without being cancelled. Some orders taken last February have not yet come through for shipment. There is but little stock being made and there is a place for nearly every machine that comes through.

Foreign business is coming in right along. There are indications of railroads coming into the market and several important lines are putting out specifications. It is said that the Pennsylvania railroad has three small shops in contemplation. This feature of the trade is being watched with much interest. The crop situation is also regarded as a matter of concern with machine builders, and if the important corn states can pass the month of September without frost, a good large crop, perhaps one only exceeded by that of last year will result; at least, that is regarded by authorities as the promise at this time. Last year there was no damaging frost until about October 10, and the outlook for a good corn crop is most encouraging.

Extensions and additions to shops and to equipment are being steadily prosecuted. Old machines are being replaced with new and later types. The output was large this month and some shops made records.

The American Tool Works Co. in July made its record output for the plant and in August exceeded its July record, thus establishing its highest record the past month.

The D. T. Williams Valve Co., which was a sufferer by the fire of last week, has established temporary headquarters on Eighth street east of Broadway.

The Triumph Mfg. Co. which now occupies the third floor of the building of the Cincinnati Machine Tool Co. will move into its own plant on Spring Grove avenue in the near future and the Cincinnati Machine Tool Co. will utilize the entire building for its business.

The Lodge & Shipley Machine Tool Co. is installing a number of new planers and has replaced a large number of its lathes in its shop with its own newer types. The grading is being done for an extension of the shop and a new Allis-Chalmers engine is practically installed. Large additions to the plant are under way and when the plans now under consideration are brought to completion, this will be one of the big machine tool plants in the country.

Eaton, Rhodes & Co., of Cincinnati, have established near Newport, Ky., a yard with facilities for breaking and handling extremely heavy cast iron scrap, such as ingot molds, housings, blast furnace castings and salamander. The equipment is new and complete and the firm is prepared to handle pieces weighing up to 30 tons. This department is to be separate from, and will not conflict with the regular pig iron and coke business of the firm.

LIFE OF J. J. SPEARMAN.

(Continued from page 378.)

This plant was sold to W. P. Snyder, of Pittsburg, in 1901, and is now No. 3 of the Sharpsville group of the Shenango Furnace Co. The old books of the Spearman Iron Co. show that during the first 18 months of operation the co-partnership lost $50,000, it being estimated that the iron cost them $34 a ton to make, and that sufficient ore to produce one ton of iron cost the company $20 on the cars at the furnace. Early in its career the company received $40 a ton for its iron, but prices within a few months sagged to $20 per ton, and it was the average inventory upon which the loss was calculated.

Speaking of the variable prices of pig iron, Mr. Spearman specifically refers to two instances. The first, the experience of the Spearman Iron Co. when the drop from $40 to $20 occurred within two or three months, while in the great boom of 1852, following the favorable tariff of 1846, it was two years before the prosperous period flattened out. Mr. Spearman says that in both instances the cause was the same, namely, the importation of iron from England. Going back to the boom of 1852 he says that there was no Atlantic cable, and that foreign iron with the slow means of communication could not reach the United States short of five to six months from the time it was ordered, whereas in 1879 the Atlantic cable had been installed and communication with Europe was established as readily as between points in this country. Foreign iron could be ordered by cable one day, sold the next and delivered to the purchaser in this country within a month.

It was not until 1883, Mr. Spearman says, that iron ore began to decline in price and became more plentiful on account of the increased operations on the Lake Superior ranges, and from that time the real progress of the furnace business dates and grew by leaps and bounds. When the great Marquette range was discovered, furnacemen began to have more of their own way, and the owners of ore properties sought the furnacemen in order to sell them, rather than the furnacemen seeking the owners of ore properties. With the later discovery of the Menominee, Gogebic and Mesabi ranges there was no longer any difficulty in securing an adequate supply of Lake Superior ores.

Ore Prices.

Some interesting data on the early purchase price of Lake Superior ore are secured from the books of the Spearman Iron Co. In 1872, for a grade of ore, inferior to that secured in 1898, $12 per ton was paid. In 1898 Mr. Spearman, for the Spearman Iron Co., bought 12,000 tons of Lake Superior ore at $1.80 per ton delivered on Lake Erie docks, and according to his records of the monthly meeting of the furnace company held in March, 1898, he bought 40,000 tons at $2.35, 15,000 tons at $2.98, 10,000 tons at $2.48, 10,000 tons at $2.35, 5,000 tons at $2.45, all of a Bessemer grade, while on the same date he purchased 20,000 tons of non-Bessemer ore at $2.10 per ton, and 10,000 tons at $2.05.

BRIDGE DISASTER

At Quebec Being Investigated by Canadian Government.

Toronto, August 31.—The Canadian government has ordered an investigation into the Quebec bridge disaster to be conducted by Henry Holgate, C. E., who accompanied by M. J. Buller, deputy minister of railways, has gone to Quebec. The destruction of the bridge, which was expected to be completed in 1909, will undoubtedly delay considerably the completion of the Grand Trunk Pacific railway, as it was to form the connecting link between the sections north and south of the St. Lawrence.

Sentiment in Securities Improves

A steady improvement in sentiment has been an encouraging development in the stock market within the week. This favorable view of the future is based upon a feeling that the causes of active weakness in the market have been relieved. It has been strongly promoted within the week by the announcement of the plan of Secretary of the Treasury Cortelyou, to bring government funds to the relief of the stringent money situation. The official announcement is made that beginning next week the treasury department will make each week for a period of not less than five weeks, deposits in national banks at New York, Boston and other points, the security to be acquired to be approved state, municipal and railroad bonds, acceptable under the existing requirement of the department, with the understanding that if called for, such deposits shall be returned after Jan. 1 next, the installments to be fixed by the secretary of the treasury. The immediate effect of this declaration was the lively buying of active issues which resulted in sharp gains, but the favorable news likewise gradually lent itself to the support of the market and the week's improvement can be largely attributed to this source. Due to it also, an easier feeling was noted in the money market. What fluctuation was displayed by the market in the week was within narrow limits, and this is interpreted to mean that for the time being at least, pressing liquidation has been completed. For this reason bearish attacks are less effective, though at the same time, the buying power is limited. A prominent feature of the week's dealings was the buying of American securities for foreign account, this movement being the most important from this source experienced in weeks. A more cheerful feeling was also reported in foreign financial circles. The air has been charged with rumors and reports favorable as well as unfavorable, but the most helpful in the way of adding to the market's strength has been one to the effect that J. P. Morgan & Co. have promised to put in an acceptable bid for the $40,000,000 of 4½ per cent of stocks and bonds of the city of New York to be sold Sept. 10. While this report is not accepted as technically true, it is believed that the city comptroller has ample assurance that the bond issue will be a success, else he would not have made the definite announcement of the sale nor would he have made the issue such a large one as he did. The announcement of the distribution of $1 a share, payable Sept. 16, upon the certificates of the Great Northern Ore Co. was well received, but had no immediate effect. This is the first dividend to be declared on the certificates of which 1,500,000 are outstanding.

Financial Notes.

The regular quarterly dividend of 1¼ per cent on the preferred stock, payable Oct. 1, has been declared by the directors to the American Can Co.

The Pittsburg Coal Co., and subsidiary companies, report that in the month of July net earnings were $343,041, against $194,077 the corresponding month of 1906, or a gain of $148,964. The July, 1907, gross earnings were $577,322, against $461,631 in July, 1906, or a gain of $115,691. For the seven months ended July 31 the total net earnings of the company were $1,471,052, against $1,052,414 a year ago, or a gain of $418,638. The gross earnings in the seven months were $3,102,431, corresponding with $2,864,054 a year ago, or a gain of $256,377.

The National Trans-continental railway commission of Canada has given out contracts for about 36,000 tons of steel rails for the Grand Trunk Pacific, the orders being divided between the Dominion Iron & Steel Co. of Sydney, N. S. and the Algoma Steel Works, Sault Ste. Marie. The price of the Algoma company's rails, free on boats at Fort William, is about $34 per ton, and the Dominion Steel Co. undertakes to deliver its rails at Quebec for a price about $33.50. The Canadian tenders were considerably lower than those of American.

The Standard Sanitary Mfg. Co. of Pittsburg, Ltd., with $250,000 capital, has been incorporated.

THE LEADING INDUSTRIAL SECURITIES.

	Clos'ng Quo. Aug. 31	Changes in Week	Date 1907 Ann. M't'g	Stock Outstanding	Dividend Basis	Dividend Last Paid	Dividend Date Last Div. Pay.
Allis-Chalmers	6⅜	+ ⅛	Sept. 5	19,820,000		.....	.....
Allis-Chalmers pr	19⅞	− ⅛		16,150,000	7 cum	.....	Feb., 1904
American Can	4½	.....	Feb. 7	41,233,300		.....	.....
Am. Can pr	46¼	+ ⅛		41,233,300	7 cum	5	Apr., 1907
Am. Car and Fdy	39½	+2¾	June 27	30,000,000		2 Q.	Apr., 1907
Am. Car and Fdy pr	95	+ ½		30,000,000	7 n. c.	7	Apr., 1907
American Loc	52⅜	+ ⅜	Oct. 5	25,000 000		1¾ Q.	Aug., 1907
American Loc. pr	100	+2		24,100,000	7 cum	1¾ Q.	July, 1907
American Ship	60	−1	Oct. 2	7,600.000	6	1 Q.	June, 1907
American Ship pr	103½	.....		7,900.000	7 n. c.	1¾ Q.	Jan , 1907
Am. Steel Foundries	5⅜	.....	Oct. 1	15,810,000		.....	.....
Am. Steel Foundries pr.	31	.....		17,240,000	6 cum	.....	Aug., 1904
Barney & Smith	65	.....	June 4	2,000,000	4	1 Q.	June, 1907
Barney & Smith pr	128½	.....		2,500.000	8 cum	2 Q.	June, 1907
Bethlehem Steel	10	.....	April 2	14,862,000		.....	.....
Bethlehem Steel pr	30	.....		14,908,000	7 n. c.	1¾ Q.	May, 1907
Cambria Steel	29½	.....	March 19	45,000,000*	6	1½ S. A.	Aug., 1907
Cambria Iron	44	.....		8,468,000*	4	4 S. A.	Apr., 1907
Chicago Pneumatic Tool	37⅞	.....	Feb. 18	6,145 800	4	1 Q.	July, 1907
Colorado Fuel	24½	+2	Oct. 21	30,132,000		.....	Apr., 1902
Crucible Steel	7	+ ⅛	Oct. 16	24.578.400		.....	.....
Crucible Steel pr	65½	+3¼		24,436.500	7 cum	6	Mar., 1907
Empire Steel	8	.....	Feb. 27	2,281,400		.....	.....
Empire Steel pr	55	.....		2,500,000	6 cum	3 S. A.	July, 1906
Fay & Egan	100	.....	Feb. 19	1 000.000	6	1¼ Q.	Aug., 1907
Fay & Egan pr	128½	.....		1,000 000	7 cum	1¾ Q.	Aug., 1907
General Electric	127⅞	+6⅝	May 14	63,643.600	8	2 Q.	July, 1907
Harbison-Walker	13	.....	Jan. 21	18,000,000	6	.....	.....
Harbison-Walker pr	71½	.....		9.600,000	6 cum	1½ Q.	July, 1907
International Pump	21¾	+1¾	June 4	17,762,500		2	Apr., 1905
International Pump pr	72	+5½		11,350,000	6 cum	1½ Q.	Aug., 1907
Lackawanna Steel	45	.....	March 13	34,971.400		.....	.....
Lake Sup. Corp	5½	.....	Oct. 2	40,000,000		.....	.....
New York Air Brake	110	+3¼	June 18	10,000,000	8	8	Apr., 1907
Niles-Bement-Pond	130	.....	Feb. 6	5,000,000	6	6	Mar., 1907
Niles-Bement-Pond pr	105	.....		2.000,000	6 cum	1¼ Q.	Aug., 1907
Otis Elevator Co	30	.....	March 18	6.350 300		3 A.	Apr., 1907
Otis Elevator Co. pr	80	.....		6,308 500	6 n. c.	1½ Q.	July, 1907
Penn. Steel	60	.....	May 13	10,750 000		.....	.....
Penn. Steel pr	98	.....		16,500 000	7 n. c.	3½ S. A.	May, 1907
Pittsburg Coal Co	8⅝	+ ¾	Feb. 11	32 000.000		.....	Nov., 1906
Pittsburg Coal pr	48	−2		32,000,000	7	.....	Apr., 1905
Pressed Stl. Car	28⅝	+1⅝	Feb. 20	12.500,000		3	Aug., 1904
Pressed Stl. Car pr	85	+2		12 500.000	7 n. c.	1¾ Q.	Aug., 1907
Pullman	155½	+2½	Oct. 17	100,000 000	8	2 Q.	Aug., 1907
Railway Stl. Spring	36	+1¾	March 7	13 500.000		4 S. A.	Mar., 1907
Railway Stl. Spring pr	87½	.....		13.500,000	7 cum	1¾ Q.	June, 1907
Rep. Iron & Steel	20¼	+1⅛	Oct. 16	27 191,000		.....	.....
Rep. Iron & Steel pr	71¾	+ ¾		20.416 000	7 cum	1¾ Q.	July, 1907
Sloss-Sheffield	46¾	+1¾	March 5	10,000,000	5	5	June, 1907
Sloss-Sheffield pr	95	.....		6 700,000	7 n. c.	1¾ Q.	July, 1907
Tenn. Coal & Iron	135	.....	May 7	22.553 060	4	1 Q.	Aug., 1907
U. S. Pipe & Fdy	31¾	+3¼	June 26	12 500,000	4	1 Q.	June, 1907
U. S. Pipe & Fdy. pr	77¼	+ ¼		12 500 000	7 n. c.	1¾ Q.	June, 1907
U. S. Steel	31¾	+1¾	April 15	508,302 500	2 n. c.	½ Q.	July, 1907
U. S. Steel pr	94¾	+2⅜		360,281,100	7 cum	1¾ Q.	June, 1907
U. S. Steel 5's	93½	+1⅛		463.798 000	5	5 A.	.....
Va. Iron, Coal & Coke	48	.....	Sept. 17	8,641,600		.....	.....
Westinghouse Elec	137	.....	July 24	24 998,700*	10	10	Apr., 1907
Westinghouse Air Brake	142½	+1½	Oct. 1	11,000,000*		22½	Jan., 1907

Par value of shares, $100, except those starred (*), $50.

NEWS FROM MANY INDUSTRIES

New Buyers:—

The Gibson Foundry Co., West Bend, Wis., capital $2,000, has been chartered by John Klumb, Philip Gibson and Michael Gibson.

Articles of incorporation have been filed by the Maine Machine Works, Los Angeles, Cal., with a capital of $10,000. The directors are: M. J. Russell, E. E. Russell, C. A. Russell, F. Russell and W. D. Wise.

John B. Lang, Ernest D. Button and William H. Morrison have organized the J. B. Lang Engine & Garage Co., Ithaca, N. Y., with a capital of $18,000. The company will manufacture engines, boilers and machinery.

Peter Gray & Sons, Boston, capital $30,000, have been chartered to manufacture sheet metal goods. The officers of the company are: President, G. M. Gray; treasurer, J. F. Gray; clerk, M. H. Gray, all of 86 Union street, Boston.

The Royal Enameling & Stamping Works, Des Plaines, Ill., has been chartered with a capital of $150,000 by John D. York, Nathan D. Kaplan and Fred W. Kraft.

Articles of incorporation have been filed by the Buckeye Forge & Iron Co., Columbus, O., with a capital of $50,000. Those interested are: Charles E. Smith, Clark E. Allen, John E. Shaffer, Icilius C. Reasoner, Frank P. Kanouse and H. W. Peters.

The American Motor Cooling Co., Buffalo, N. Y., has been chartered with an authorized capital of $20,000 by M. F. Dirnberger Jr., E. H. Dirnberger and Owen B. Angspurger, all of the address given above. The company will manufacture radiators, cooling devices for motors, etc.

The George Steam Turbine Co., Boston, machinery business, has been chartered with an authorized capital of $50,000. The officers of the company are: President, F. A. Keniston, Cambridge; treasurer, G. Hidden, 54 Fourth street, Cambridge; clerk, C. F. Richardson, 53 State street, Boston.

The Bay State Engine Co., Boston, machinery business, has been organized with a capitalization of $25,000. The officers of the company are: President, A. Schwartz, 31 Hancock street; treasurer, A. Green, 1 Allen street; clerk, A. Golden, 44 Stillman street, all of Boston.

With a capital of $50,000 the Worcester Injector & Valve Co., Worcester, Mass., has been organized to manufacture machinery. The officers of the company are: President, N. B. Dodge, 15 Home street; treasurer, G. H. Scott, 30 Channing street; clerk, P. Potter, 340 Main street, all of Worcester.

The Acme Furnace Equipment Co., New York, has filed articles of incorporation with a capital of $100,000 to manufacture engines, boilers, machinery, etc. The incorporators are: J. M. Howard, 157 West Fifteenth street; Edgar Hirschberg, 745 St. Anns avenue; Leslie C. Ferguson, 11 Pine street, all of New York.

The Tool Steel, Motor Gear & Pinion Co., Cincinnati, has been incorporated for $100,000 and has leased a factory building adjoining the Hess Spring & Axle Co., at Carthage, O. The company will manufacture tool steel, gear wheels, motor gear wheels and pinions. Those interested are: L. B. Daniel, G. W. Simpkinson, W. C. Renaker, M. D. Pottinger and Stanley Struble.

New Construction:—

Elmer E. Phelps, Syracuse, N. Y., foundryman, is erecting an addition to his plant which will more than double its present capacity.

The Corbin Screw Co., New Britain, Conn., has awarded the contract to the B. H. Hubbard Co., of that city, for a three-story addition 40 x 60 feet.

Redin, Ekstrom & Co., Rockford, Ill., machinists, have acquired a site in that city for the erection of a plant sufficiently large to meet their increased requirement. A building 50 x 90 feet will be erected at once and the company eventually expects to occupy the entire site.

The Taylor Iron & Steel Co. is making arrangements for the erection of a plant at High Bridge, N. J., to consist of a one-story machine shop, 112 x 164 feet, a one-story dry sand molding building, 26 x 365 ft., and a one-story belting shop 104 x 118 feet. The buildings will be of steel construction with exterior walls of brick.

The Pittsburg Foundry & Machine Co., Salem, O., has begun work upon the construction of a new foundry 96 x 100 feet. Other buildings are in contemplation. The Pittsburg company has been occupying a portion of the plant of the Salem Tool Co., but the extension of the latter's business has demanded that the space now used be given to its operations.

Extensive improvements and additions are being made to the plant of the Keystone Driller Co., Beaver Falls, Pa., manufacturer of portable well drilling and prospecting machines and Downie deep well pumps. The company will shortly be in the market for some minor equipment, such as a steel converter, blowers, cold saws, emery wheels, dry pans, etc.

The Hammack Steel Range Co., Knoxville, Tenn., recently incorporated, will manufacture steel ranges. The company will erect a building 50 x 410 feet and will require new machinery throughout including cupolas, engines, boilers, etc. The initial output will be about 25 tons per day. M. V. Hammack is president and manager, E. J. Wooten, vice president, and Frank J. Jones, secretary and treasurer.

The Oaks Mfg. Co., New Bern, N. C., is erecting a plant for the manufacture of farm machinery and implements. The buildings consist of an iron and woodworking shop, 40 x 80 feet; assembling house, 32 x 70 feet; paint shop, 28 x 40 feet; receiving house for raw material, 30 x 60 feet; blacksmith shop, 28 x 40 feet, and an office, 16 x 28 feet. The greater portion of the equipment, consisting of lathes, shapers, grinders, drill presses, etc., has already been purchased and will be operated by electric power. The necessary motors, however, have not yet been ordered. W. B. Blades is president and W. C. Willett, secretary and treasurer.

Andrew J. Vollrath, president of the Jacob J. Vollrath Mfg. Co., Sheboygan, Wis., manufacturer of porcelain enameled sheet steel and cast iron wares, has disposed of his interests and retired from the company. He has acquired a large tract of land covering 1,000 lots in Sheboygan, with a railroad frontage of 3,500 feet, and has broken ground for a new plant which will be devoted to the manufacture of porcelain enameled plumbers' supplies and other enameled products. The main building will be 60 x 300 feet, two stories high. It is expected that the plant will be in operation within 90 days. The new company will be known as the Vollrath Co., and will be a close corporation, consisting of A. J. Vollrath and his two sons, Carl and Walter Vollrath.

General Industrial Notes:—

The Danville Car Co., Danville, Ill., has increased its capital stock from $250,000 to $750,000.

The Milwaukee Stamping & Specialties Co., Milwaukee, has changed its name to the Metal Stamping & Mfg. Co.

The Cowing Engineering Co., Cleveland, has increased its capital stock from $100,000 to $1,200,000. The company is now completing an extensive

structural plant at Collinwood, and the increase of capital has been made in connection with this investment.

At a meeting of the board of directors of the Southern Car Wheel Iron Co., Tallapoosa, Ga., Aug. 23, the following officers were elected: Rowe Price, president and treasurer; John M. McCandless, vice president, and Walter M. Kelley, secretary.

The plant of the Cheswick Mfg. Co., Canton, O., has passed into the hands of F. G. Borden and associates of Pittsburg. The plant was erected originally for the manufacture of pressed steel cars, but the new owners, it is announced, will manufacture enameled bath tubs, wash stands and sinks.

The Bartlett-Tewksbury Machinery Mfg. Co., Birmingham, Ala., has been placed in the hands of a receiver upon petition of David Blake, Tarrytown, N. Y., and others, who declare that the company is indebted to them. H. W. Coffin has been named by the court to take charge of the company.

Announcement has been made that the new plant of the Westinghouse Electric Machine Co., erected in East Pittsburg, will be ready for operation about Sept. 15. The building is 70 x 400 feet and eight stories in height. It will be used for the manufacture of switches, coils, small motors, etc.

The Gardner General Foundry Co., Gardner, Mass., recently organized to succeed the Gardner Foundry Co. and the General Foundry Co., of that city, will at this time manufacture only small and medium castings up to 1,000 pounds in weight. The company desires literature covering the latest molding machines, electric shakers and chippers, cranes and hoists.

A. J. Detlaff, manufacturer of special novelties and fine gray iron castings, has purchased the building at 121-129 Champlain street, Detroit, formerly occupied by the Detroit Can Co., and has remodeled it, installing the necessary machinery, which will be run by motor. The building is 60 x 138 feet and four stories high. Mr. Detlaff will manufacture all kinds of specialties, fine gray iron castings, polished and plated complete, wood and metal pattern making and model making of all kinds.

The L. S. White Forging Co., Endicott, N. Y., manufacturer of special forgings and forgings for trucks, drays and heavy vehicles, announces that it has completed its drop forgings plant and expects to be operating within 30 days. The founder of the company, LeRoy S. White, has been engaged in the drop forging business for the past four years and has equipped the plant with the latest improved machinery and tools. The officers of the company are: L. S. White, president; Charles E. White, secretary, and H. M. Rogers, manager.

Trade Notes:—

The Vulcan Iron Works, Winnipeg, Manitoba, has installed a Northern three-motor electric traveling crane built by the Northern Engineering Works, Detroit. The latter company also recently furnished the Erie City Iron Works, Erie, Pa., with a 15-ton hand power crane.

Fires:—

The foundry of Thomas Aston & Son, Milwaukee, suffered a small loss by fire, Aug. 16.

The Sabin Machine Co., Cleveland, sustained a loss of $2,000, confined to machinery, by fire Aug. 21.

The upper stories of the machine shop of Adolph Hoffman, Orange, N. J., were damaged by fire, Aug. 21.

The plant of the Terrell Foundry & Machine Co., Terrell, Tex., was greatly damaged by fire, Aug. 24, causing a loss estimated upwards of $10,000.

The Etna Iron & Steel Co., Etna, Ga., sustained a loss of $25,000, partly covered by insurance, Aug. 23, from a fire which destroyed its No. 2 ore washer, together with a locomotive and a number of cars.

A recent fire which started in the plant of the National Enameling & Stamping Co., St. Louis, caused a loss of about $100,000, including damage to the National company of about $50,000, to the Moran Nut & Bolt Co., $5,000, and to the Eave & Trough Wire Co., $5,000.

Buffalo Foundry Co. Absorbs David Bell Engineering Works.—The Buffalo Foundry Co., Buffalo, has been reincorporated under the firm name of the Buffalo Foundry & Machine Co., having recently absorbed the David Bell Engineering Works. The latter concern has been engaged in building steam hammers, and the line will be extended by the Buffalo Foundry & Machine Co. The manufacture of vacuum drying and impregnating apparatus has also been commenced. A machine shop of reinforced concrete construction 100 x 160 feet will be built, but for the present the old David Bell plant will continue to be occupied. The Buffalo Foundry & Machine Co. will continue its jobbing foundry business and will produce gray iron, semi-steel and air furnace castings as heretofore. At the present time this concern is filling an order for 20 gas engine beds for the Allis-Chalmers Co., Milwaukee, weighing 93 tons each.

INDUSTRIAL AWAKENING

Has Followed California's Realization of her Unseized Opportunities.

(Special Correspondence.)

San Francisco, Aug. 30.—"It is an ill wind." From the most stupendous disaster in all history which befell California in April, 1906, much good is coming. The earthquake which shook San Francisco and the surrounding country for many miles, seems to have awakened the people of California to the realization that it is poor policy to depend entirely upon outside sources for its wants in manufactured articles.

When the people, with almost two hundred million dollars of insurance money in hand, and many more millions due from the same source, started to rebuild the city, they found thay had no material, nor did they have factories or plants sufficient to supply the demand, or anything approaching it, and that they were too far from the industrial centers to receive any considerable supply by land and water within reasonable time. It was the first time that the moneyed men in California began to realize that the Golden State, with an abundance of raw material, was as good a place to manufacture what it needs, as any other, and that it may be better to pay the higher wages commanded by labor, than to send the raw material abroad and then bring the manufactured article back, and pay freight both ways.

That the new idea is being put into practice, and in good shape, is barely known outside of California. Among the new industries springing up in California, Newark on the upper bay, furnishes a fair example, and bids fair to become a manufacturing center in the near future.

Newark is twenty-nine miles distant from San Francisco, and twenty miles from Oakland, and close to the Dunmarton cut-off, where the new union bridge is in course of construction, which gives the place its definite destiny of industrial importance. All railroads entering San Francisco converge at that point. Already the James Graham Manufacturing Co., the most extensive stove foundry west of Chicago, has its plant in operation at that place, and a new stove foundry has been started quite recently. A planing mill, the largest in Alameda county, is also located in the town. The land is perfectly level and can be had at nominal cost for factory sites, where ship and rail come together. The cost of living is fully forty per cent less than in a large city; the climate is temperate, out of the fog belt, sheltered from the wind, and the temperature is ten degrees warmer than San Francisco, summer and winter.

TRADE PUBLICATIONS.

Steel Piling.—The Carnegie Steel Co., Pittsburg, has issued a catalog describing the Friestedt interlocking channel bar piling and also the United States steel sheet piling, both of which are manufactured by the Carnegie Company. The catalog comprises 15 pages and explains the advantages and uses of steel piling, presents tables of shapes and dimensions, methods of driving, etc. This piling is adapted for river and harbor protection, land reclamation projects, dams, docks, wharves, coffer-dams, foundations, sewer and trench work, retaining walls, etc.

Snow Plow Machinery.—The Wilder Snow Plow Mfg. Co., Worcester, Mass., is distributing a 16 page booklet describing the Wilder radial snow plow, for use on electric and steam railroads.

Vises.—The Pittsburg Automatic Vise & Tool Co., Pittsburg, has issued a catalog describing the Pittsburg automatic vise for automobiles. It comprises principally illustrations printed in white on a black background illustrating the vise and its applications.

Drying Machinery.—"Drying Materials in Industrial Plants" is the title of a pamphlet issued by the Green Fuel Economizer Co., Matteawan, N. Y., and describes the drying of various materials, fabrics, malt, lumber, paper, pulp, etc. Besides describing and illustrating the fans, blowers, steam coils, etc., manufactured by this company for these purposes, an account is given of the philosophy of drying. The pamphlet also describes the Green air heater, utilizing the waste heat in flue gases from boiler or other purposes for heating and drying.

Grinding and Drilling Machinery.—James Clark, Jr. & Co., Louisville, Ky., is distributing a number of sheets illustrating the Willey grinding and drilling machinery. These comprise water tool grinders, grinders for lathe carriages or tool posts, center grinders with and without feed mechanism, bench grinders, surface grinders, sensitive drills, breast drills, hand drills, hack saws, etc. The sheets are 8½ x 11 inches and present descriptions, illustrations and tables of dimensions.

Flange Union.—The Western Tube Co., Kewanee, Ill., has published a 4-page pamphlet illustrating the Kewanee flange union which will make a pipe joint even when the pipe alignment is imperfect. The union is made in sizes from one inch up to ten inches.

Feed-Water Heaters.—The Harrison Safety Boiler Works, Philadelphia, is distributing an 8-page booklet, summarizing the action of the Cochrane feed-water heater. The economy in the installing of an open feed-water is shown, and examples are given of practical applications at coal mines, paper mills and in steam plants generally. It also describes the Cochrane oil separator, which makes it possible to use exhaust steam for all purposes to which live steam of the same temperature could be applied, as for heating, drying, etc.

Pneumatic Hammers.—The Ingersoll-Rand Co., 11 Broadway, New York City. 24 pages. 6 x 9 inches. This pamphlet illustrates and describes the "Crown" pneumatic hammer, a new design by this company, made in five sizes for chipping, caulking, scaling, flue beading, etc., and in four sizes with long stroke for driving rivets from the smallest size up to 1⅜-inch diameter. It also gives a description of a displacement air meter, by which the performance of these tools has been tested and verified.

Core Machines.—The Falls Rivet & Machine Co., Cuyahoga Falls, Ohio. 54 pages. 6 x 9 inches. This catalog describes the Wadsworth improved core machines and core equipment, showing machines for making both round and slab shaped cores, and also the Wadsworth multiple spindle core making machine, the Wadsworth cutting off and core coning machine and the Wadsworth portable core oven.

Lathes and Drills.—The Miami Valley Machine Tool Co., Dayton, O. 6 x 9 inches. 15 pages. This catalog describes the 13½-inch by 6-foot engine lathe manufactured by this company, in addition to a line of sensitive drills. In addition to the lathe shown in the catalog, machines are also made with a 5-foot and an 8-foot bed, and taper attachment.

Hydraulic Machinery.—The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn. 6 x 9 inches. 152 pages. Illustrates and describes a large line of hydraulic machinery comprising embossing presses, pipe testers, automatic drawing presses, vertical drawing presses, horizontal push benches, horizontal pull benches, horizontal draw benches, accumulators, combined accumulators and pumps, power pumps, hydraulic forging machines, special machinery and valves.

Steel Structures.—The Interstate Engineering Co., Cleveland, is distributing circular No. 101, being advance sheets of bulletin No. 8. This shows a number of structures built by this company.

Thermit.—The Goldschmidt Thermit Co., 90 West street, New York, is distributing a pamphlet entitled "Metals Free From Carbon Produced by the Aluminothermic Method," being a reprint from the *Electro-chemical Industry* and *Electro-chemical and Metallurgical Industry*. It reviews the method of production and details the characteristics and uses of various metals produced, including nickel, manganese, etc., together with their effects on castings. Experiments with vanadium and titanium are detailed and advantages of the aluminothermic methods for introducing these metals are given.

Lifting Magnets.—The Cleveland Armature Works, Cleveland, which has recently gone into the manufacture of lifting magnets, has issued a catalog 7¾ x 10 inches, 16 pages, describing and illustrating interpole bell and flat magnets. The bell magnet is designed especially for handling pig iron, scrap, skull crackers and all small pieces of iron and steel, one-piece ingots and large irregularly shaped pieces. The flat magnet is designed for handling flat surface pieces weighing from 1 to 12 tons. The catalog presents numerous illustrations of the magnet at work lifting various articles and gives information regarding their performance.

Corliss Engines.—The Minneapolis Steel & Machinery Co., Minneapolis, is distributing brochure No. 101, a handsome publication of 40 pages, 6 x 9 inches. It is printed in two colors and describes in detail the various portions of the "Twin City" Corliss engine giving photographs of actual installations and tables of dimensions and capacities of engines. These engines are built in sizes from 8 x 24 inches to 38 x 60 inches, ranging in capacity from 24 horsepower to 2,100 horsepower.

Forcing Presses.—The Watson-Stillman Co., N. Y., has issued sectional catalog No. 70 comprising 130 6 x 9 pages. It describes a large range of press machinery and contains much material that has never been shown before. Many new sizes of tools have also been added and are shown in this catalog for the first time. The machinery listed comprises coupling bolt forcers, forcing presses, mandrel presses, locomotive axle bearing presses, vertical bushing presses, broaching presses, wheel presses, assembling presses, armature clamping presses, converter presses, etc.

Metallic Packing.—A booklet descriptive of the metallic packing manufactured by the C. Lee Cook Mfg. Co., Louisville, Ky., is being distributed. It contains a description of packing suitable for steam, gas and air engines, together with a long list of users.